

www.iaea.org/books



IAEA Publications Catalogue 2019



Contact IAEA Publications

Marketing and Sales Unit Publishing Section International Atomic Energy Agency Vienna International Centre, P.O. Box 100 1400 Vienna, Austria Email: sales.publications@iaea.org Tel.: +43 1 2600 22529/22530 Fax: +43 1 26007 22529 Web site: www.iaea.org/books

10	Publications 2017–2019
	137 Series Index
	147 Ordering Locally
	149 Order Form

Contents

HUMAN HEALTH	10
Nuclear Medicine (including Radiopharmaceuticals)	12
Medical Physics, Dosimetry and Diagnosis	12
Radiotherapy	13
FOOD AND AGRICULTURE	16
Food Irradiation	20
Soil Fertility and Irrigation	21
NUCLEAR MEASUREMENT TECHNIQUES AND INSTRUMENTATION	24
Physics	29
Chemistry	30
Nuclear Analytical Techniques	30
Research Reactors and Particle Accelerators (Applications)	31
Nuclear Data	34
EARTH SCIENCES	36
Uranium Geology, Exploration and Mining	38
INDUSTRIAL APPLICATIONS	40

NUCLEAR AND	44
RADIOLOGICAL SAFETY	
Fuel Fabrication and Storage	51
Nuclear Power Plants	52
Research Reactors	59
Transport of Radioactive Material	60
Waste Repositories	61
Radiation Protection	62
Accident Response	64
Radioactive Waste Management	66
Safety Analysis	69
Legal and Governmental Aspects	73
NUCLEAR SECURITY	78
NUCLEAR POWER	88
Nuclear Power Planning and Economics	92
Nuclear Power Operations	94
Reactor Technology	97
Quality Assurance	100
Qualification and Training of Personnel	102

NUCLEAR FUEL CYCLE AND WASTE MANAGEMENT	106
Fuel Fabrication and Performance	111
Spent Fuel Management	112
Waste Management	113
PLASMA PHYSICS AND NUCLEAR FUSION	116
SAFEGUARDS	120
NUCLEAR LAW	124
ENVIRONMENT	128
SERIES INDEX	137
	147

Catalogue Information

Where to order IAEA publications

For ease of ordering, use our order form at the back of this catalogue.

Prices of books are quoted in euros and are subject to change without notice. The customer is responsible for the payment of any local taxes or duties. Shipping will be charged at cost. Publications are normally sent by surface mail. Delivery by air mail, courier service or by air freight is possible upon request.



Hardback book

A complete listing of all IAEA priced publications is available on the IAEA's web site: www.iaea.org/books

Images

Please note that the images included in this catalogue illustrate the work of the IAEA, but they may not necessarily reflect the work presented in the publication next to which they are placed.



INTRODUCTION

Atoms for Peace

The IAEA serves as the world's intergovernmental forum for scientific and technical cooperation in the nuclear field. It was set up as the world's "Atoms for Peace" organization in 1957 within the United Nations family. The IAEA works with its Member States and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies.

The IAEA's mission is guided by the interests and needs of Member States, strategic plans and the vision embodied in the IAEA Statute. Three main pillars — or areas of work — underpin the IAEA's mission: Safety and Security; Science and Technology; and Safeguards and Verification.

IAEA Publications

The IAEA is one of the leading publishers in the field of nuclear science and technology, with titles on nuclear and radiological safety, emergency response, nuclear power, nuclear medicine, nuclear waste management, nuclear law and safeguards as well as relevant topics in food and agriculture, earth science, industry and the environment.

Key publications include the IAEA Safety Standards, which detail the principles of safety for protection against ionizing radiation, and IAEA Safety Reports, which describe good practices and give practical examples and detailed methods that can be used to meet safety requirements.



Publicaciones

Публикации





Publications



Nuclear Medicine (including Radiopharmaceuticals), Medical Physics, Dosimetry and Diagnosis, Radiotherapy

HUMAN HEALTH





Cyclotron Based Production of Technetium-99m

IAEA Radioisotopes and Radiopharmaceuticals Reports No. 2



This publication presents a comprehensive overview of the technologies involved in the production of cyclotron based ^{99m}Tc. These would include techniques relevant to preparation of targets, irradiation of targets under high beam currents, target processing, target recovery and quality control of the final product. The publication provides broad information, well supported with references, on improved production routes and improved separation and purification of cyclotron based ^{99m}Tc. These approaches achieve high specific activity and chemical purity of ^{99m}Tc suitable for labelling molecules of medical interest and also enable spare capacity to be available at medical cyclotron centres. The readership of this publication is scientists interested in translating this technology to practice, technologists already working with cyclotrons wanting to enhance the utility of the existing machines and managers who are in the process of setting up facilities in their countries. Students working towards higher level degrees in related fields may also benefit from this publication.

English (59 pp., 48 figs; 2017) | ISBN 978-92-0-102916-4 | STI/PUB/1743 | €33.00

MEDICAL PHYSICS, DOSIMETRY AND DIAGNOSIS

Radiation Protection and Safety in Medical Uses of Ionizing Radiation

Specific Safety Guide

IAEA Safety Standards Series No. SSG-46



This Safety Guide provides recommendations and guidance on fulfilling the requirements of IAEA Safety Standards Series No. GSR Part 3 for ensuring radiation protection and safety of radiation sources in medical uses of ionizing radiation with regard to patients, workers, carers and comforters, volunteers in biomedical research, and the public. It covers radiological procedures in diagnostic radiology (including dentistry), image guided interventional procedures, nuclear medicine, and radiotherapy. Recommendations and guidance are provided on applying a systematic approach to ensure that there is a balance between being able to utilize the benefits from medical uses of ionizing radiation and minimizing the risk of radiation effects to people.

English (318 pp., 2 figs; 2018) | ISBN 978-92-0-101717-8 | STI/PUB/1775 | €54.00

Dosimetry of Small Static Fields Used in External Beam Radiotherapy

An International Code of Practice for Reference and Relative Dose Determination

Technical Reports Series No. 483



This is the first international code of practice dedicated to the dosimetry of small static fields used in radiotherapy. It provides consistent reference dosimetry, traceable to metrological primary standards, and enables common procedures within a country to be followed. The publication presents an overview of the physics, followed by a general formalism for reference dosimetry in small fields. Guidelines for its practical implementation using suitable detectors and methods for the determination of field output factors are given for specific clinical machines that use small static fields. The development of this code of practice has been done through an international working group, established jointly with the American Association of Physicists in Medicine. Internationally harmonized guidelines in this field will ensure worldwide consistency in dose delivery to radiotherapy patients and will contribute to dose standardization in international clinical trial studies, comparing outcomes of various radiotherapy treatment modalities using small fields.

English (211 pp., 31 figs; 2017) | ISBN 978-92-0-105916-1 | STI/D0C/010/483 | €52.00



Introduction of Image Guided Radiotherapy into Clinical Practice

IAEA Human Health Reports No. 16

Recent advances in external beam radiotherapy include the technology to image the patient in the treatment position, in the treatment room at the time of treatment. Since this technology and associated image techniques, termed image guided radiotherapy, are perceived as the cutting-edge of development in the field of radiotherapy, there is a concern that radiotherapy departments need orientation as to the preparatory conditions and resources involved in implementation. In addition, the current status of the evidence supporting the use of image guided radiotherapy in terms of patient outcomes has to be kept in mind when planning to invest in these technologies. This publication provides the guidelines and highlights the milestones to be achieved by radiotherapy departments in the safe and effective introduction of image guided radiotherapy.

English (Forthcoming) | ISBN 978-92-0-103218-8 | STI/PUB/1827 | €31.00

Medical Physics Staffing Needs in Diagnostic Imaging and Radionuclide Therapy: An Activity Based Approach

IAEA Human Health Reports No. 15



Over the last decades, the rapid technological development of diagnostic and interventional radiology and nuclear medicine has made them major tools of modern medicine. However, at the same time the involved risks, the growing number of procedures and the increasing complexity of the procedures require competent professional staff to ensure safe and effective patient diagnosis, treatment and management. Medical physicists (or clinically qualified medical physicists) have been recognized as vital health professionals with important and clear responsibilities related to quality and safety of applications of ionizing radiation in medicine. This publication describes an algorithm developed to determine the recommended staffing levels for clinical medical physics services in medical imaging and radionuclide therapy, based on current best practice, as described in international guidelines.

English (23 pp.; 2018) | ISBN 978-92-0-107817-9 | STI/PUB/1797 | €20.00

Radiotherapy in Cancer Care: Facing the Global Challenge



Cancer treatment is complex and calls for a diverse set of services. Radiotherapy is recognized as an essential tool in the cure and palliation of cancer. Currently, access to radiation treatment is limited in many countries and non-existent in some. This lack of radiotherapy resources exacerbates the burden of disease and underscores the continuing health care disparity among States. Closing this gap represents an essential measure in addressing this global health equity problem. This publication presents a comprehensive overview of the major topics

and issues to be taken into consideration when planning a strategy to address this problem, in particular in low and middle income countries. With contributions from leaders in the field, it provides an introduction to the achievements and issues of radiation therapy as a cancer treatment modality around the world. Dedicated chapters focus on proton therapy, carbon ion radiotherapy, intraoperative radiotherapy, radiotherapy for children, HIV/AIDS related malignancies, and costing and quality management issues.

English (544 pp., 68 figs; 2017) | ISBN 978-92-0-115013-4 | STI/PUB/1638 | €62.00







IAEA Publications CATALOGUE 2019



Food Irradiation, Soil Fertility and Irrigation

FOOD AND AGRICULTURE



Approaches to Improvement of Crop Genotypes with High Water and Nutrient Use Efficiency for Water Scarce Environments

Final Report of a Coordinated Research Project

IAEA TECDOC Series No. 1828



Projected global population increase and the impacts of climate change on agriculture highlight the importance of the use of improved crop varieties coupled with better soil, water and fertilizer management practices designed to protect the natural resource base. This publication is the outcome of a coordinated research project (CRP) and focuses on the practical application of nuclear and related techniques, such as mutation induction and the use of stable isotopes of nitrogen [N-15] and carbon [C-13]. The use of such techniques can improve crop productivity with mutant varieties and best-fit soil management practices in diverse agroecological zones affected by drought, high temperatures, water scarcity, soil acidity and soil salinity. The findings of the CRP will be highly valuable to agricultural scientists and laboratory technicians of national agricultural research organizations in Member States as a resource for improving soil and crop productivity.

English (124 pp., 27 figs; 2017) | ISBN 978-92-0-108117-9 | IAEA-TECDOC-1828 | €18.00

Cassava Production Guidelines for Food Security and Adaption to Climate Change in Asia and Africa

IAEA TECDOC Series No. 1840



Cassava is the third largest source of human food and animal feed carbohydrates in the tropics, after maize and rice. It is a major food crop in Africa and also grown in a number of countries in Asia. However, declining soil fertility and poor farming practices are serious problems for traditional cassava farms in both Asia and Africa. This publication is intended to assist Member States in enhancing their cassava production. It provides information on the best farm management practices and the role of nuclear and isotopic techniques to better understand nutrient nitrogen (N) uptake. The guidelines presented in the publication provide an integrated and crop-need-based nutrient, weed, insect pest and disease management plan for growing cassava. By using these improved crop management methods, farmers can optimize cassava yields and minimize production costs. They also contribute to a reduction in land degradation by soil erosion, particularly on sloping lands, thereby protecting the local environment. The intended end result is an enhancement of the quality and market value of cassava products.

English (68 pp., 23 figs; 2018) | ISBN 978-92-0-101718-5 | IAEA-TECDOC-1840 | €18.00

Guidelines for Developing Wetlands in Agricultural Catchments

IAEA TECDOC Series No. 1811

			EA-TEC00C-18	0
Guide	lines for			
Devel in Agr	oping Wet icultural C	lands atchment	s	
(A)	6)			
	EA			

This publication presents the results of an international research project on optimizing the capture and storage of water by assessing nutrient using water conservation zones in agricultural landscapes. Eight countries from Asia Pacific, Africa and Europe participated in the project. Field studies were established in all participating countries using isotopic and nuclear techniques to assess three types of water conservation zones that are used to harvest water for irrigation, crop production and improve downstream water guality. In addition, isotopic and nuclear techniques were used to collect data to identify the ideal locations in the landscapes for developing wetlands. The publication provides information to researchers working in the area of soil and water management, natural resource managers, policy makers and farmers. For those working to develop wetlands, information is provided to support planning, monitoring and evaluation.

English (68 pp., 16 figs; 2017) | ISBN 978-92-0-100917-3 | IAEA-TECDOC-1811 | €18.00



Rice Production Guidelines: Best Farm Management Practices and the Role of Isotopic Techniques

IAEA TECDOC Series No. 1847



This publication is intended to enhance rice production and provides information on best management practices. The role of isotopic techniques to quantify nitrogen use efficiency is addressed and information presented to support a better understand of the pathways of greenhouse gases emission. The publication informs the reader on improved rice varieties and sustainable cultivation practices from a wide range of Asian countries. This will enable national research

and development staff to select and test these varieties and practices in farmers' fields to promote improved rice varieties and crop management practices in the respective countries. By using these improved crop management methods, farmers can improve the productivity and profitability of rice crops through the adoption of locally adapted 'best' rice varieties, thereby protecting the local environment.

English (132 pp., 51 figs; 2018) | ISBN 978-92-0-103418-2 | IAEA-TECDOC-1847 | €18.00

Use of Carbon Isotopic Tracers in Investigating Soil Carbon Sequestration and Stabilization in Agroecosystems

IAEA TECDOC Series No. 1823



This publication provides an overview of conventional and isotopic methods available for measuring and modelling soil carbon dynamics. It includes information on the use of carbon isotopes in soil and plant research, including both theoretical and practical aspects of nuclear and radioisotope tracer techniques for in situ glasshouse and field labelling techniques to assess soil organic carbon turnover and sequestration, and provides up-to-date information on topics related to soil carbon sequestration and stabilization in agroecosystems. With its focus on practical application of radiotracer

and stable isotope tracer techniques, it will be particularly useful for university and national research scientists working to improve soil organic matter management and conservation in agricultural systems.

English (120 pp., 20 figs; 2017) | ISBN 978-92-0-106417-2 | IAEA-TECDOC-1823 | €18.00



Manual of Good Practice in Food Irradiation

Technical Reports Series No. 481



Ensuring that the process of irradiating food delivers the desired result consistently is essential for the correct application of the technology and will help to inspire consumer confidence in irradiated food. This publication aims to help operators of irradiation facilities to appreciate and improve their practices and also to provide detailed, yet straightforward, technical information for stakeholders such as food regulators, manufacturers and traders, who also need to understand 'good practice'.

English (85 pp., 24 figs; 2015) | ISBN 978-92-0-105215-5 | STI/DOC/010/481 | €48.00

Spanish (91 pp., 24 figs; 2017) | ISBN 978-92-0-306116-2 | STI/D0C/010/481 | €48.00

SOIL FERTILITY AND IRRIGATION

Challenges and Opportunities for Crop Production in Dry and Saline Environments in ARASIA Member States

IAEA TECDOC Series No. 1841

n in Dry and its in
tates

This publication serves as a referencing guide for Member States and interested specialized readers wishing to work on agriculture in dry and saline environment, in particular located in the Middle East region. All information and instructions given in this guide are based on successful and sound practices applied in pertaining Member States for sustainable cropping of salt affected soils. It will help scientists and farmers to select management alternatives most efficient for agriculture in saline environments within their own countries. The publication also focuses on the possible use of isotopes techniques in dealing with salinity and droughts conditions affecting crop production.

English (123 pp., 15 figs; 2018) | ISBN 978-92-0-101918-9 | IAEA-TECDOC-1841 | €18.00



Cosmic Ray Neutron Sensing: Use, Calibration and Validation for Soil Moisture Estimation

IAEA TECDOC Series No. 1809



Nuclear and related techniques can help develop climate smart agricultural practices by optimizing water use efficiency. The measurement of soil water content is essential to improve the use of this resource in agriculture. However, most sensors monitor small areas (less than 1m in radius), hence a large number of sensors are needed to obtain soil water content across a large area. This can be both costly and labour intensive and so larger scale

measuring devices are needed as an alternative to traditional point-based soil moisture sensing techniques. The cosmic ray neutron sensor (CRNS) is such a device that monitors soil water content in a non-invasive and continuous way. This publication provides background information about this novel technique, and explains in detail the calibration and validation process.

English (48 pp., 13 figs; 2017) | ISBN 978-92-0-101017-9 | IAEA-TECDOC-1809 | €18.00

Managing Irrigation Water to Enhance Crop Productivity under Water-limiting Conditions: A Role for Isotopic Techniques

Final Report of a Coordinated Research Project

IAEA TECDOC Series No. 1813



This publication presents the outcome of an IAEA coordinated research project and provides research findings and isotopic methodologies to quantify the soil evaporation component of water losses and determine the transpiration efficiency for several important crop species under a variety of environments. The TECDOC also presents a simple, fast and portable vacuum distillation apparatus for extraction water from soil and plant samples for isotopic analyses for the separation of soil evaporation, which helped to reduce the bottleneck in sample throughput for many soil water and hydrology studies.

English (180 pp., 94 figs; 2017) | ISBN 978-92-0-103717-6 | IAEA-TECDOC-1813 | €18.00

Soil Moisture Mapping with a Portable Cosmic Ray Neutron Sensor

IAEA TECDOC Series No. 1845



This publication was developed as an informational guide for soil moisture mapping at landscape level through a portable 'backpack' cosmic-ray neutron sensor. This recently developed device monitors soil water content in a non-invasive way using background neutron counts. It is used to measure water content in the topsoil over wide areas, covering approximately 20 hectares with one single measurement. Through its mobility and combining series of measurements, this provides the spatial variability of the soil water content for better agricultural water management. The publication provides scientists, technicians and students with the necessary information, guidance and steps to calibrate, validate and deploy this portable cosmic-ray neutron sensor.

English (43 pp., 22 figs; 2018) | ISBN 978-92-0-102018-5 | IAEA-TECDOC-1845 | €18.00





Physics, Chemistry, Nuclear Analytical Techniques, Research Reactors and Particle Accelerators (Applications), Nuclear Data

NUCLEAR MEASUREMENT TECHNIQUES AND INSTRUMENTATION



Advances in Neutron Activation Analysis of Large Objects with Emphasis on Archaeological Examples

Results of a Coordinated Research Project

IAEA TECDOC Series No. 1838



This publication is a compilation of the main results and findings of an IAEA coordinated research project (CRP). In particular, it discusses an innovative variation of neutron activation analysis (NAA) known as large sample NAA (LSNAA). There is no other way to measure the bulk mass fractions of the elements present in a large sample (up to kilograms in mass) non-destructively. Examples amenable to LSNAA include irregularly shaped archaeological artefacts, excavated rock samples, large samples of assorted ore, and finished products, such as nuclear reactor components. Advantages of LSNAA applications, limitations and scientific and technological requirements are described in this publication, which serves as a reference of interest not only to the NAA experts, research reactor personnel, and those considering this technique, but also to various stakeholders and users such as researchers, industrialists, environmental and legal experts, and administrators.

English (72 pp., 11 figs; 2018) | ISBN 978-92-0-100618-9 | IAEA-TECDOC-1838 | €18.00

Cosmic Ray Neutron Sensing: Use, Calibration and Validation for Soil Moisture Estimation

IAEA TECDOC Series No. 1809



Nuclear and related techniques can help develop climate smart agricultural practices by optimizing water use efficiency. The measurement of soil water content is essential to improve the use of this resource in agriculture. However, most sensors monitor small areas (less than 1m in radius), hence a large number of sensors are needed to obtain soil water content across a large area. This can be both costly and labour intensive and so larger scale measuring devices are needed as an alternative to traditional point-based soil moisture sensing techniques. The cosmic ray neutron sensor (CRNS) is such a device that monitors soil water content in a non-invasive and continuous way. This publication provides background information about this novel technique, and explains in detail the calibration and validation process.

English (48 pp., 13 figs; 2017) | ISBN 978-92-0-101017-9 | IAEA-TECDOC-1809 | €18.00

Development of an Integrated Approach to Routine Automation of Neutron Activation Analysis

Results of a Coordinated Research Project

IAEA TECDOC Series No. 1839



Neutron activation analysis (NAA) is a powerful technique for determining bulk composition of major and trace elements. Automation may contribute significantly to keep NAA competitive for end-users. It provides opportunities for a larger analytical capacity and a shorter overall turnaround time if large series of samples have

to be analysed. This publication documents and disseminates the expertise generated on automation in NAA during a coordinated research project (CRP). The CRP participants presented different cost-effective designs of sample changers for gamma-ray spectrometry as well as irradiation devices, and were able to construct and successfully test these systems. They also implemented, expanded and improved quality control and quality assurance as crosscutting topical area of their automated NAA procedures. The publication serves as a reference of interest to NAA practitioners, experts, and research reactor personnel, but also to various stakeholders and users interested in basic research and/or services provided by NAA. The individual country reports are available on the CD-ROM attached to this publication.

English (70 pp., 25 figs; 2018) | ISBN 978-92-0-103818-0 | IAEA-TECDOC-1839 | €18.00

Guidelines on Soil and Vegetation Sampling for Radiological Monitoring

Technical Reports Series No. 486

This publication addresses the sampling of soil and vegetation in terrestrial ecosystems, including agricultural, forest and urban environments, contaminated with radionuclides from events such as radiation accidents, radiological incidents and former nuclear activities. It considers sampling strategies and programmes, which are relevant for both emergency and existing exposure situations. Practical advice is provided on the design and implementation of sampling programmes for soil and vegetation within the framework of environmental monitoring. Examples of best practice on the formulation of optimized sampling strategies for different exposure situations are given based on the experience and lessons learned from implementation of past and existing programmes.

English (Forthcoming) | ISBN 978-92-0-102218-9 | STI/D0C/010/486 | €76.00



Proficiency Testing by Interlaboratory Comparison Performed in 2010–2015 for Neutron Activation Analysis and Other Analytical Techniques

IAEA TECDOC Series No. 1831



The IAEA supports its Member States to increase the utilization of their research reactors. Small and medium sized reactors are mostly used for neutron activation analysis (NAA). Although the markets for NAA laboratories have been identified, demonstration of valid analytical results and organizational quality of the work process are preconditions for expanding the stakeholder community, particularly in commercial routine application of this powerful technique. The IAEA has implemented a new mechanism for supporting NAA laboratories in demonstrating their analytical performance by participation in proficiency testing schemes by interlaboratory comparison. This activity makes possible the identification of deviations and non-conformities, their causes and the process to implement effective approaches to eliminate them. Over 30 laboratories participated between 2010 and 2015 in consecutive proficiency tests organized by the IAEA in conjunction with the Wageningen Evaluating Programmes for Analytical Laboratories (WEPAL) to assess their analytical performances.

This publication reports the findings and includes lessons learned of this activity. An attached CD-ROM contains many individual participating laboratory papers sharing their individual results and experience gained through this participation.

English (84 pp., 18 figs; 2017) | ISBN 978-92-0-108617-4 | IAEA-TECDOC-1831 | €18.00

Soil Moisture Mapping with a Portable Cosmic Ray Neutron Sensor

IAEA TECDOC Series No. 1845



This publication was developed as an informational guide for soil moisture mapping at landscape level through a portable 'backpack' cosmic-ray neutron sensor. This recently developed device monitors soil water content in a non-invasive way using background neutron counts. It is used to measure water content in the topsoil over wide areas, covering approximately 20 hectares with one single measurement. Through its mobility and combining series of measurements, this provides the spatial variability of the soil water content for better agricultural water management.

The publication provides scientists, technicians and students with the necessary information, guidance and steps to calibrate, validate and deploy this portable cosmic-ray neutron sensor.

English (43 pp., 22 figs; 2018) | ISBN 978-92-0-102018-5 | IAEA-TECDOC-1845 | €18.00

Uses of Ionizing Radiation for Tangible Cultural Heritage Conservation

IAEA Radiation Technology Series No. 6



The preservation of world cultural heritage is a key issue for maintaining national identity and understanding the influences or exchanges among civilizations throughout

PHYSICS

history. Development of appropriate preservation techniques that do not compromise longevity or authenticity are therefore of utmost importance. Radiation techniques have demonstrated significant success in the disinfestation and preservation of cultural heritage artefacts, and national and international research programmes have developed harmonized methodologies for such radiation treatment. This publication provides state of the art knowledge on radiation technology applied to the conservation and consolidation of items of cultural heritage and will be of use to collection curators, conservators, restorers, registrars, art historians, archaeologists and conservation scientists active in the various fields of cultural heritage in museums, libraries, archives, archaeological institutions, historical buildings and conservation workshops.

English (241 pp., 92 figs; 2017) | ISBN 978-92-0-103316-1 | STI/PUB/1747 | €50.00

Accelerator Simulation and Theoretical Modelling of Radiation Effects in Structural Materials

IAEA Nuclear Energy Series No. NF-T-2.2



This publication summarizes the findings and conclusions of the IAEA coordinated research project (CRP) on accelerator simulation and theoretical modelling of radiation effects, aimed at supporting Member States in the development of advanced radiation resistant structural materials for implementation in innovative nuclear systems. This aim can be achieved through enhancement of both experimental neutron-emulation capabilities of ion accelerators and improvement of the predictive efficiency of theoretical models and computer codes. This dual approach is

challenging but necessary, because outputs of accelerator simulation experiments need adequate theoretical interpretation, and theoretical models and codes need high dose experimental data for their verification. Both ion irradiation investigations and computer modelling have been the specific subjects of the CRP, and the results of these studies are presented in this publication which also includes stateof-the-art reviews of four major aspects of the project: challenges and trends of structural materials development for present and future reactor designs, accelerator methodologies for material testing, multiscale modelling tools, and advanced examination techniques.

English (116 pp.; 2018) | ISBN 978-92-0-107415-7 | STI/PUB/1732 | €39.00

Best Practices in Physics Based Fault Rupture Models for Seismic Hazard Assessment of Nuclear Installations

Proceedings of a Workshop Held in Vienna, 18-20 November 2015

IAEA TECDOC Series No. 1833



These proceedings present the outcomes of a workshop convened by the IAEA in 2015. The workshop brought together experts in seismology and earthquake engineering to discuss the applicability of the so called physics-based fault rupture models to generate synthetic earthquake ground motion data for meaningful extrapolation of ground motion prediction in areas where there is a lack of sufficient observations. Fault rupture modelling is recommended for estimating strong motion in cases where nearby faults contribute significantly to the seismic hazard for nuclear installations. The overall aspects and process of the modelling and ground motion simulation are described in IAEA Safety Standards Series No. SSG-9, published in 2010. However, after the massive earthquake

in Japan in 2011, there has been further progress in physics-based fault rupture modelling. Therefore, the IAEA arranged this workshop and the publication arising from it. The intention is to provide practical, up-to-date guidance contributing to effective seismic hazard analysis.

English (2018) | ISBN 978-92-0-158917-0 | IAEA-TECDOC-CD-1833 | €18.00 🖉

The Environmental Behaviour of Polonium

Technical Reports Series No. 484



This publication covers polonium behaviour in the terrestrial, freshwater and marine environments, dose considerations and mitigation and remediation options. Additionally, case studies are presented. The primary objective is to provide Member States with information for use in the radiological assessment of accidental releases and routine discharges of polonium in the environment, and in remediation planning for areas contaminated by polonium.

English (255 pp., 32 figs; 2017) | ISBN 978-92-0-112116-5 | STI/D0C/010/484 | €80.00

NUCLEAR ANALYTICAL TECHNIQUES

Development of an Integrated Approach to Routine Automation of Neutron Activation Analysis

Results of a Coordinated Research Project

IAEA TECDOC Series No. 1839



Neutron activation analysis (NAA) is a powerful technique for determining bulk composition of major and trace elements. Automation may contribute significantly to keep NAA competitive for end-users. It provides opportunities for a larger analytical capacity and a shorter overall turnaround time if large series of samples have to be analysed. This publication documents and disseminates the expertise generated on automation in NAA during a coordinated research project (CRP). The CRP participants presented different cost-effective designs of sample changers for gamma-ray spectrometry as well as irradiation devices, and were able to construct and successfully test these systems. They also implemented, expanded and improved quality control and quality assurance as crosscutting topical area of their automated NAA procedures. The publication serves as a reference of interest to NAA practitioners, experts, and research reactor personnel, but also to various stakeholders and users interested in basic research and/or services provided by NAA. The individual country reports are

available on the CD-ROM attached to this publication.

English (70 pp., 25 figs; 2018) | ISBN 978-92-0-103818-0 | IAEA-TECDOC-1839 | €18.00

Improvement of the Reliability and Accuracy of Heavy Ion Beam Analysis

Technical Reports Series No. 485

This publication highlights the achievements of an IAEA coordinated research project addressing limitations in the utilization of heavy ions, through the delivery of better analytical tools with a higher degree of reliability, accuracy, and user confidence, thereby enabling an expansion in the range of problems that can be solved. Relevant to researchers in ion beam laboratories, which utilize heavy ion beams for materials research, this publication will also be of interest to those using light ion beams for other materials science problems, as the underlying knowledge is common to all ion beam types. The database of the new stopping cross-sections included in this publication contains extensive new data not available before.

English (Forthcoming) | ISBN 978-92-0-103517-2 | STI/D0C/010/485 | €45.00

RESEARCH REACTORS AND PARTICLE ACCELERATORS (APPLICATIONS)



Analyses Supporting Conversion of Research Reactors from High Enriched Uranium Fuel to Low Enriched Uranium Fuel

IAEA TECDOC Series No. 1844



This publication was developed based on the results of an IAEA coordinated research project (CRP) and will serve as a reference to those potentially involved in conversion of research reactors from high enriched uranium (HEU) to low enriched uranium (LEU). The publication contains comprehensive design and safety analyses for the conversion of miniature neutron source reactors (MNSRs) and includes analyses that were performed by MNSR operating organizations participating in the CRP using data specific to their MNSR. The outcome of this CRP can therefore be used

to provide best practice guidelines in preparation for conversion of research reactors by individual research reactor operating organizations, and as a procedural and methodological reference for regulatory bodies and other stakeholders involved in the conversion of research reactors.

English (245 pp., 126 figs; 2018) | ISBN 978-92-0-101818-2 | IAEA-TECDOC-1844 | €18.00

Cyclotron Based Production of Technetium-99m

IAEA Radioisotopes and Radiopharmaceuticals Reports No. 2



This publication presents a comprehensive overview of the technologies involved in the production of cyclotron based ^{99m}Tc. These would include techniques relevant to preparation of targets, irradiation of targets under high beam currents, target processing, target recovery and quality control of the final product. The publication provides broad information, well supported with references, on improved production routes and improved separation and purification of cyclotron based ^{99m}Tc. These approaches achieve high specific activity and chemical purity of ^{99m}Tc suitable for labelling molecules of medical interest and also enable spare capacity to be available at medical cyclotron centres. The readership of this publication is scientists interested in translating this technology to practice, technologists already working with cyclotrons wanting to enhance the utility of the existing machines and managers who are in the process of setting up facilities in their countries. Students working towards higher level degrees in related fields may also benefit from this publication.

English (59 pp., 48 figs; 2017) | ISBN 978-92-0-102916-4 | STI/PUB/1743 | €33.00

Feasibility Study Preparation for New Research Reactor Programmes

IAEA Nuclear Energy Series No. NG-T-3.18



This publication describes the various elements to be included in a comprehensive, robust and logically structured feasibility study report for a new research reactor project. It provides guidance for the main supporting organization or team of a new research reactor to enable them to undertake an authoritative and comprehensive feasibility study that could be submitted to decision makers for their review in order to support proposals and endorse an action plan for construction of such a facility. It includes considerations of justification for a new research reactor, associated key nuclear infrastructure issues, cost-benefit analysis and risk management that would have to be addressed prior to authorizations for the establishment of a new research reactor. Addressing these issues will help Member States to develop a comprehensive understanding of all the roles, obligations and commitments involved in establishing and operating a research reactor and ensure that these are met during all phases of the project life cycle. The publication also includes a generic template for

preparing a feasibility study report and provides some examples and lessons learned from individual Member States in preparing such studies.

English (33 pp.; 5 figs; 2018) | ISBN 978-92-0-104518-8 | STI/PUB/1816 | €30.00

Proficiency Testing by Interlaboratory Comparison Performed in 2010–2015 for Neutron Activation Analysis and Other Analytical Techniques

IAEA TECDOC Series No. 1831



The IAEA supports its Member States to increase the utilization of their research reactors. Small and medium sized reactors are mostly used for neutron activation analysis (NAA). Although the markets for NAA laboratories have been identified, demonstration of valid analytical results and organizational quality of the work process are preconditions for expanding the stakeholder community, particularly in commercial routine application of this powerful technique. The IAEA has implemented a new mechanism for supporting NAA laboratories in demonstrating their analytical performance by participation in proficiency testing schemes by interlaboratory comparison. This activity makes possible the identification of deviations and non-conformities, their causes and the process to implement effective approaches to eliminate them. Over 30 laboratories participated between 2010 and 2015 in consecutive proficiency tests organized by the IAEA in conjunction with the Wageningen Evaluating Programmes for Analytical Laboratories (WEPAL) to assess their analytical performances.

This publication reports the findings and includes lessons learned of this activity. An attached CD-ROM contains many individual participating laboratory papers sharing their individual results and experience gained through this participation.

English (84 pp., 18 figs; 2017) | ISBN 978-92-0-108617-4 | IAEA-TECDOC-1831 | €18.00

Research Reactors: Safe Management and Effective Utilization

Summary of an International Conference Held in Vienna, 16-20 November 2015

Proceedings Series



The International Conference on Research Reactors: Safe Management and Effective is the major networking event for the research reactor community worldwide taking place every four years. The multidisciplinary scientific and technological applications that research reactors supported and continue supporting have spawned advances in academia, industry, medicine, food and agriculture. This publication provides a summary of the conference, the major findings and conclusions of the sessions, and the opening and closing addresses. The accompanying CD-ROM includes the individual technical papers and presentations. These proceedings are expected to serve as a valuable source of information for specialists involved in research reactor operation and utilization as well as for regulatory authorities in the IAEA Member States.

English (66 pp.; 2017) | ISBN 978-92-0-105117-2 | STI/PUB/1793 | €40.00

Strategic Planning for Research Reactors

IAEA Nuclear Energy Series No. NG-T-3.16



This publication is a revision of IAEA-TECDOC-1212 which primarily focused on enhancing the utilization of existing research reactors. This updated version also provides guidance on how to develop and implement a strategic plan for a new research reactor project and will be of particular interest for organizations which are preparing a feasibility study to establish such a new facility. This publication will enable managers to determine more accurately the actual and potential capabilities of an existing reactor, or the intended purpose and type of a new facility. At the same time, management will be able to match these capabilities to stakeholders/users' needs and establish the strategy of meeting such needs. In addition, several annexes are presented, including some examples as clarification to the main text and ready-to-use templates as assistance to the team drafting a strategic plan.

English (61 pp., 7 figs; 2017) | ISBN 978-92-0-101317-0 | STI/PUB/1771 | €38.00

NUCLEAR DATA

Development of a Reference Database for Particle Induced Gamma Ray Emission (PIGE) Spectroscopy

IAEA TECDOC Series No. 1822



Ion beam analysis techniques are non-destructive analytical techniques used to identify the composition and structure of surface layers of materials. The applications of these techniques span environmental control, cultural heritage and conservation, materials and fusion technologies. The particle-induced gamma-ray emission (PIGE) spectroscopy technique in particular, is a powerful tool for detecting light elements in certain depths of surface layers. This publication describes the coordinated effort to measure and compile cross section data relevant to PIGE analysis and make these data available to the community of practice through a comprehensive online database.

English (244 pp., 141 figs; 2017) | ISBN 978-92-0-106317-5 | IAEA-TECDOC-1822 | €18.00





Uranium Geology, Exploration and Mining

EARTH SCIENCES


Geological Classification of Uranium Deposits and Description of Selected Examples

IAEA TECDOC Series No. 1842



With the increased level of investigation into uranium deposits in recent years, a wealth of new information has become available, which has made it possible to investigate some of the least understood aspects of uranium metallogeny. This publication defines a new classification scheme, which is simple and descriptive, but flexible enough to encompass the recent advances in our understanding of uranium geology and deposit genesis. It contains improved definition of the deposit types, supported by type examples of those deposits for which good data are available, but not well described

in previous literature. Along with the descriptive information, new data on uranium resources available for each deposit type are also provided.

English (428 pp., 209 figs; 2018) | ISBN 978-92-0-101618-8 | IAEA-TECDOC-1842 | €18.00



Uranium Resources as Co- and By-products of Polymetallic, Base, Rare Earth and Precious Metal Ore Deposits

IAEA TECDOC Series No. 1849

			- milet entering stat
Co. a	nd By-nro	irces as	
Polyn	netallic, B	ase,	
Rare	Earth and		
Preci	ous Metal	Ore Dep	osits

This publication highlights the potential presence of uranium in ore deposits that are not commonly thought of as uraniferous and therefore highlights potential additional sources of uranium supply. It also provides insights into potential legacy mine waste issues for such deposits if the uranium is not extracted. The publication also outlines various historical mining and processing approaches, supported by case studies of each deposit type. The appendix to this publication includes a detailed IAEA deposit classification of uranium deposits and their global distribution, and shows for comparison purposes the equivalent distribution of other deposit types not traditionally considered as uranium deposits (but nevertheless with uranium extraction potential).

English (168 pp., 69 figs; 2018) | ISBN 978-92-0-103618-6 | IAEA-TECDOC-1849 | €18.00

World Distribution of Uranium Deposits (UDEPO)

2016 Edition

IAEA TECDOC Series No. 1843

		3	IEA-TECODE-1	ίġ.
World	Distributio	on of		
2016 Edit	m Deposi Ion	ts (UDEPI))	

The World Distribution of Uranium Deposits (UDEPO) is a database on technical, geographical and geological characteristics of worldwide uranium deposits. The current version presents and describes modifications made since 2009. It presents a preliminary statistical and tabular analysis of the data for the first time, with a view to ensuring that the data is robust enough to serve as a basis for more sophisticated analysis in the future. This is supported by a detailed explanation of the structure of the database to better understand the nature of the data as a form of metadata. Furthermore, some basic graphical representations of the statistical and spatial distribution of the database is presented for the first time.

English (260 pp., 32 figs; 2018) | ISBN 978-92-0-101518-1 | IAEA-TECDOC-1843 | €18.00



World Distribution of Uranium Deposits

Second Edition



In 1995 the International Atomic Energy Agency published a hard copy map of World Distribution of Uranium Deposits, in collaboration with the Geological Survey of Canada. This second edition of the World Distribution of Uranium Deposits presents new information, such as additional deposits, a broader range of deposit sizes, a revised deposit classification system and improved geological visualisation information. The online pdf version also includes enhanced functionality with layers and query capability.

English (2018) | ISBN 978-92-0-100118-4 | STI/PUB/1800 | €20.00



INDUSTRIAL APPLICATIONS



Industrial Applications of Nuclear Energy

IAEA Nuclear Energy Series No. NP-T-4.3



This publication provides a detailed overview of the potential use of nuclear energy for industrial systems and/or processes which have a strong demand for process heat/steam and power, and on the mapping of nuclear power reactors proposed for various industrial applications. It describes the technical concepts for combined nuclear—industrial complexes that are being pursued in various Member States, and presents the concepts that were developed in the past to be applied in connection with some major industries. It also provides an analysis of the energy demand in various industries and outlines the potential that nuclear energy may have in major industrial applications such as process steam for oil recovery and refineries, hydrogen generation, and steel and aluminium production. The audience for this publication includes academia, industry, and government agencies.

English (80 pp., 32 figs; 2017) | ISBN 978-92-0-101417-7 | STI/PUB/1772 | €59.00





Fuel Fabrication and Storage, Nuclear Power Plants, Research Reactors, Transport of Radioactive Material, Waste Repositories, Radiation Protection, Accident Response, Radioactive Waste Management, Safety Analysis, Legal and Governmental Aspects

NUCLEAR AND RADIOLOGICAL SAFETY



A Methodology for Establishing a National Strategy for Education and Training in Radiation, Transport and Waste Safety

Safety Reports Series No. 93



() IAEA

This publication provides Member States with a detailed methodology to establish a national strategy for education and training in radiation, transport and waste safety, in order to build competence in a sustainable and timely manner. Guidance is provided on assessing education and training needs, giving consideration to the national legal and regulatory framework for education and training, and the current and future facilities and activities; designing the national education and training programme based on the needs; and optimizing national resources to complement external assistance. A practical example of the application of the methodology is generated for a hypothetical country, outlining the chronological sequence of the actions to be taken, their timeframe, including the role and contribution from the different national stakeholders. This methodology has been tested in the field during 20 regional workshops attended by about 300 participants from more than 80 Member States

English (66 pp., 2 figs; 2018) | ISBN 978-92-0-102217-2 | STI/PUB/1778 | €41.00

Building Capacity for Nuclear Security

Implementing Guide

IAEA Nuclear Security Series No. 31-G



Each State has the primary responsibility to build the capacity of organizations and people in order to develop, implement, and sustain a nuclear security regime. To discharge its responsibilities, the State has to strengthen its capacity at national, organisational and individual levels. Specifically, the State has to be able to enhance the competences and capabilities of relevant stakeholders in fulfilling their responsibilities within the nuclear security regime. Such endeavour involves various elements in capacity building, ranging from education and training to the development of knowledge network. This publication is intended to serve as a reference document for Member States to develop a national capacity building strategy for nuclear security. It addresses all organizations involved in nuclear security and reflects the multidisciplinary and cross-institutional nature of this task, as well as the long term efforts that are required.

English (62 pp.; 2018) | ISBN 978-92-0-111916-2 | STI/PUB/1764 | €40.00

Decommissioning of Facilities

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 6



Decommissioning is the last step in the lifetime management of a facility. It must also be considered during the design, construction, commissioning and operation of facilities. This publication establishes requirements for the safe decommissioning of a broad range of facilities: nuclear power plants, research reactors, nuclear fuel cycle facilities, facilities for processing naturally occurring radioactive material, former military sites, and relevant medical, industrial and research facilities. It addresses all the aspects of decommissioning for decommissioning, conduct of decommissioning actions and termination of the authorization for decommissioning. It is intended for use by those involved in policy development, regulatory control and implementation of decommissioning.

Arabic (25 pp., 2 figs; 2016) | ISBN 978-92-0-600216-2 | STI/PUB/1652 | €25.00 Chinese (19 pp., 2 figs; 2015) | ISBN 978-92-0-510215-3 | STI/PUB/1652 | €25.00 English (23 pp., 2 figs; 2014) | ISBN 978-92-0-102614-9 | STI/PUB/1652 | €25.00 French (25 pp., 2 figs; 2017) | ISBN 978-92-0-205217-8 | STI/PUB/1652 | €25.00 Russian (29 pp., 2 figs; 2015) | ISBN 978-92-0-404515-4 | STI/PUB/1652 | €25.00 Spanish (25 pp., 2 figs; 2017) | ISBN 978-92-0-300417-6 | STI/PUB/1652 | €25.00

Ensuring Robust National Nuclear Safety Systems — Institutional Strength in Depth

A Report by the International Nuclear Safety Group

INSAG Series No. 27



Defence in depth has become a fundamental aspect of the analysis of the adequacy of technical systems to assure nuclear power plant safety. It is a comprehensive approach to providing a systematic means to analyse and assure layers of systems to prevent or mitigate accidents. This publication is intended to provide a philosophy to guide the thinking about the institutional structures necessary to assure nuclear safety. It refers to the three important institutional subsystems – the industry, regulator and stakeholders – and describes the interfaces that should be nurtured among these as well as within each subsystem. The publication is intended to serve as a fundamental tool in the continuing efforts to strengthen nuclear safety.

English (24 pp., 4 figs; 2017) | ISBN 978-92-0-102317-9 | STI/PUB/1779 | €24.00

Establishing the Infrastructure for Radiation Safety

Specific Safety Guide

IAEA Safety Standards Series No. SSG-44



No. SSG-44

The objective of this Safety Guide is to provide guidance on the establishment of the national radiation safety infrastructure that meets the IAEA safety standards. It provides recommendations, in the form of actions, on meeting the relevant Safety Requirements in an effective and integrated manner while taking specific national circumstances into full consideration. This Safety Guide does not diminish the application of, or provide a synopsis of or a substitute for, the IAEA Safety Fundamentals and Safety Requirements publications or other associated Safety Guides. Rather it sets out a holistic approach to the establishment of the national radiation safety infrastructure and provides advice for the application of IAEA safety standards for both, States having essentially no elements of the radiation safety infrastructure in place, and those that already have some.

English (85 pp., 2 figs; 2018) | ISBN 978-92-0-101517-4 | STI/PUB/1773 | €42.00

Human and Organizational Aspects of Assuring Nuclear Safety — Exploring 30 Years of Safety Culture

Proceedings of an International Confernence Held in Vienna, Austria, 22-26 February 2016

Proceedings Series

These proceedings present the outcome of an international conference, at which the nuclear community had the opportunity to reflect on the pivotal role that human and organizational aspects play in assuring nuclear safety. Held 30 years after the Chernobyl accident which led to the international adoption of the concept of safety culture, the conference provided distinguished experts and practitioners with a unique opportunity to share insights from the past and visions for a safer future. The publication contains the conference opening and closing addresses, summaries of all conference sessions as well as the fully edited papers produced for the conference plenary sessions. The papers presented at the parallel sessions and dialogue sessions of the conference are included in their original form in the CD-ROM accompanying the publication.

English (Forthcoming) | ISBN 978-92-0-103918-7 | STI/PUB/1810 | €55.00

Leadership and Management for Safety

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 2



This Safety Requirements publication establishes requirements that support Principle 3 of the Fundamental Safety Principles in relation to establishing, sustaining and continuously improving leadership and management for safety and an integrated management system. It emphasizes that leadership for safety, management for safety, an effective management system and a systemic approach (i.e. an approach in which interactions between technical, human and organizational factors are duly considered) are all essential to the specification and application of adequate safety measures and to the fostering of a strong safety culture. Leadership and an effective management system will integrate safety, health, environmental, security, quality, human-and-organizational factors, societal and economic elements. The management system will ensure the fostering of a strong safety culture, regular assessment of performance and the application of lessons from experience. The publication is intended for use by regulatory bodies, operating organizations and other organizations concerned with facilities and activities that give rise to radiation risks.

Arabic (26 pp., 2 figs; 2016) | ISBN 978-92-0-612716-2 | STI/PUB/1750 | €30.00 Chinese (23 pp., 2 figs; 2016) | ISBN 978-92-0-510316-7 | STI/PUB/1750 | €30.00 English (26 pp., 2 figs; 2016) | ISBN 978-92-0-104516-4 | STI/PUB/1750 | €30.00 French (28 pp., 2 figs; 2016) | ISBN 978-92-0-208216-8 | STI/PUB/1750 | €30.00 Russian (30 pp., 2 figs; 2017) | ISBN 978-92-0-412516-0 | STI/PUB/1750 | €30.00 Spanish (28 pp., 2 figs; 2017) | ISBN 978-92-0-309616-4 | STI/PUB/1750 | €30.00

Site Evaluation for Nuclear Installations

Safety Requirements

IAEA Safety Standards Series No. NS-R-3 (Rev. 1)



This publication establishes requirements and provides criteria for ensuring safety in site evaluation for nuclear installations. The Safety Guides on site evaluation listed in the references section provide recommendations on how to meet the requirements established in this publication. A review of Safety Requirements publications was commenced in 2011 following the accident in the Fukushima Daiichi nuclear power plant in Japan. The review revealed no significant areas of weakness and resulted in just a small set of amendments to strengthen the requirements and facilitate their implementation, which are contained in the present publication.

Arabic (29 pp., 2 figs; 2016) | ISBN 978-92-0-610016-5 | STI/PUB/1709 | €35.00 Chinese (25 pp., 2 figs; 2016) | ISBN 978-92-0-509416-8 | STI/PUB/1709 | €35.00 English (27 pp., 2 figs; 2016) | ISBN 978-92-0-106515-5 | STI/PUB/1709 | €35.00 French (29 pp., 2 figs; 2016) | ISBN 978-92-0-208116-1 | STI/PUB/1709 | €35.00 Russian (33 pp., 2 figs; 2016) | ISBN 978-92-0-409216-5 | STI/PUB/1709 | €35.00 Spanish (29 pp., 2 figs; 2017) | ISBN 978-92-0-310216-2 | STI/PUB/1709 | €35.00

The Management System for Nuclear Installations

Safety Guide

IAEA Safety Standards Series No. GS-G-3.5



This Safety Guide has been issued in support of the Safety Requirements publication on the Management System for Facilities and Activities, IAEA Safety Standards Series No. GS-R-3. It contains detailed recommendations in relation to nuclear installations, to complement the general recommendations provided in IAEA Safety Standards Series No. GS-G-3.1. This Safety Guide is applicable throughout the lifetime of a nuclear installation, including site evaluation, design, construction, commissioning, operation, and decommissioning.

English (139 pp., 5 figs; 2009) | ISBN 978-92-0-103409-0 | STI/PUB/1392 | €35.00 Russian (160 pp., 5 figs; 2014) | ISBN 978-92-0-400614-8 | STI/PUB/1392 | €35.00 Spanish (153 pp., 5 figs; 2017) | ISBN 978-92-0-307916-7 | STI/PUB/1392 | €35.00

Topical Issues in Nuclear Installation Safety

Proceedings of an International Conference Held in Vienna, Austria, 6–9 June 2017

Proceedings Series



This publication presents the proceedings of the international conference on topical issues in nuclear safety. The conference provided a unique forum to present and discuss the latest approaches, advances and challenges in the demonstration of the safety of nuclear power plants that are planned to be licensed and constructed in the near future, in particular those using water cooled reactors, including small and medium sized or modular reactors. The proceedings include the key insights and recommendations summarized by the Conference President, the executive summary of the conference including the key outcomes and recommendations attained together with the full conference programme.

English (656 pp.; 232 figs; 2018) | ISBN 978-92-0-104618-5 | STI/PUB/1829 | €57.00

Safety of Nuclear Fuel Cycle Facilities

Specific Safety Requirements

IAEA Safety Standards Series No. SSR-4



This Safety Requirements publication establishes a basis for safety and for safety assessment at all stages in the lifetime of nuclear fuel cycle facilities. A broad scope of requirements is established for site evaluation, design, construction, commissioning, operation and preparation for decommissioning that must be satisfied to ensure safety. These requirements apply to facilities for conversion, enrichment, nuclear fuel production, storage of fresh and spent fuels, reprocessing, preparation for disposal and associated research and development facilities.

English (135 pp., 1 fig.; 2017) | ISBN 978-92-0-103917-0 | STI/PUB/1791 | €48.00

Safety of Nuclear Fuel Cycle Research and Development Facilities

Specific Safety Guide

IAEA Safety Standards Series No. SSG-43



This publication provides guidance on meeting the requirements of IAEA Safety Standards Series No. NS-R-5 (Rev.1) relating to research and development facilities in the nuclear fuel cycle. It covers the lifetime of these facilities from site selection through to decommissioning, concentrating on design and operation. It applies to laboratories, pilot workshops and experimental facilities that store, handle and process uranium, plutonium and other transuranics, fission products and activated materials in significant quantities. Such facilities may be involved in the study of chemical, metallurgical or radiological properties of specific radioactive materials such as prototype nuclear fuels (before and after reactor irradiation) or nuclear material or radioactive waste arising from experimental processes. This Safety Guide also applies to research and development for processes and equipment that are envisaged for later use on an industrial scale for the nuclear fuel cycle (e.g. pilot workshops for active waste conditioning).

English (93 pp., 2 figs; 2017) | ISBN 978-92-0-103116-7 | STI/PUB/1745 | €44.00

Safety of Nuclear Fuel Reprocessing Facilities

Specific Safety Guide

IAEA Safety Standards Series No. SSG-42



This publication provides guidance on meeting the requirements of IAEA Safety Standards Series No. NS-R-5 (Rev.1) relating to nuclear fuel reprocessing facilities. It covers the lifetime of these facilities, from site selection through to decommissioning, concentrating on the design and operational phases. It applies to facilities that reprocess spent fuel and other material from nuclear power plants that use metallic and oxide fuels, including materials from mixed oxide fuel (MOX) and breeder reactors. It covers the safety issues relating to: the handling of spent fuel; mechanical treatment and the dissolution of spent fuel in acid; the separation of uranium and plutonium from fission products using solvents; the separation and purification of plutonium and uranium; and the production and storage of solutions and oxides to be used as feed material to form fresh uranium or mixed (UO2/PuO2) oxide fuel.

English (119 pp., 6 figs; 2017) | ISBN 978-92-0-103016-0 | STI/PUB/1744 | €51.00

NUCLEAR POWER PLANTS

Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants

Specific Safety Guide

IAEA Safety Standards Series No. SSG-48

This Safety Guide supplements and provides recommendations on meeting the requirements related to ageing management and long term operation that are established in IAEA Safety Standards Series No. SSR-2/1 (Rev.1), Safety of Nuclear Power Plants: Design, and IAEA Safety Standards Series No. SSR-2/2 (Rev.1), Safety of Nuclear Power Plants: Commissioning and Operation. It provides guidance for operating organizations on implementing and improving ageing management and, obsolescence management and on developing a programme for safe long term operation for nuclear power plants. It may also be used by the regulatory body in preparing regulatory requirements, codes and standards, and in verifying effective ageing management, obsolescence management and preparation for safe long term operation of nuclear power plants

English (77 pp., 10 figs; 2018) | ISBN 978-92-0-104318-4 | STI/PUB/1814 | €43.00

Assessment of Vulnerabilities of Operating Nuclear Power Plants to Extreme External Events

IAEA TECDOC Series No. 1834



The Fukushima Daiichi accident showed the need to explore scenarios where external hazards exceed the design basis. Knowledge of plant behaviour along those scenarios helps improve global safety, since the weak points can be identified and measures to limit the progression of potential accidents or to mitigate their consequences can be introduced. Based on an IAEA methodology document for Member States issued in 2011, the current publication expands the previous version by giving a more comprehensive approach and introducing the enhancements that could be identified from the research developments and practical applications in the recent years.

English (188 pp., 25 figs; 2017) | ISBN 978-92-0-108817-8 | IAEA-TECDOC-1834 | €18.00

Consideration of External Hazards in Probabilistic Safety Assessment for Single Unit and Multi-unit Nuclear Power Plants

Safety Reports Series No. 92

This publication outlines the generic methodology for probabilistic safety assessment (PSA) of nuclear power plants (NPPs) against external hazards. It integrates design, procedural, operational, human factors and both protection and mitigation aspects that are essential to model a NPP response to an external hazard and to assess the associated risk. It specifically addresses the identification and screening of external hazards considering the multiunit impact.

English (68 pp.; 2018) | ISBN 978-92-0-101917-2 | STI/PUB/1777 | €40.00

Criteria for Diverse Actuation Systems for Nuclear Power Plants

IAEA TECDOC Series No. 1848



This publication addresses a safety concern within the protection system for nuclear power plants that might result in unacceptable consequences for certain combinations of common cause failures and postulated initiating events, especially in case of programmable digital protection systems. When this situation is encountered, a diverse actuation system is often provided to back up the reactor protection system. The publication identifies and discusses common criteria for the design of diverse actuation systems at nuclear power plants (NPPs) with the aim of developing

a consensus on the adequate level of diversity in the reactor protection systems. It relates to IAEA Safety Standards Series No. SSG-39, Design of Instrumentation and Control Systems for Nuclear Power Plants, and provides specific details for utility engineers, operators, researchers, managers, and personnel responsible for all aspects of design and implementation of instrumentation and control systems of diverse actuation systems for NPPs. It will also aid Member States to support assessment of diversity in I&C architecture as a defence against common cause failures.

English (85 pp., 17 figs; 2018) | ISBN 978-92-0-103518-9 | IAEA-TECDOC-1848 | €18.00

Dependability Assessment of Software for Safety Instrumentation and Control Systems at Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.27



This publication defines a framework that represents the state of the art in assessment methodologies for safety and instrumentation and control software used at nuclear power plants. It describes an approach for developing and communicating assessments based on claims, argument and evidence. The assessment of software dependability, which encompasses properties such as safety, reliability, availability, maintainability and security, is an essential and challenging aspect of the safety justification. Guiding principles for a dependability assessment are established to provide the basis for defining an assessment strategy and implementing the assessment process. Sources of evidence for the assessment are provided and lessons learned from past digital instrumentation and control system implementation in areas such as software development, operational usage, regulatory review and platform certification are also described.

English (80 pp., 10 figs; 2018) | ISBN 978-92-0-101218-0 | STI/PUB/1808 | €38.00

Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme

Implementing Guide

IAEA Nuclear Security Series No. 19



This publication provides guidance on the actions to be taken by a State in implementing an effective nuclear security infrastructure for a nuclear power programme. The topics covered are: development of national policy and strategy; common nuclear security measures; infrastructure issues relating to nuclear and other radioactive material; associated facilities; and cooperation with other States. The guidance provided is intended primarily for use by national policy makers, national legislators, competent authorities, institutions and individuals involved in the establishment, implementation, maintenance or sustainability of the nuclear security infrastructure for a nuclear power programme.

Arabic (79 pp., 1 fig.; 2015) | ISBN 978-92-0-609515-7 | STI/PUB/1591 | €29.00 English (73 pp., 1 fig.; 2013) | ISBN 978-92-0-138010-4 | STI/PUB/1591 | €29.00 French (89 pp., 1 fig.; 2018) | ISBN 978-92-0-206817-9 | STI/PUB/1591 | €29.00 Spanish (89 pp., 1 fig.; 2018) | ISBN 978-92-0-310516-3 | STI/PUB/1591 | €29.00

Industrial Safety Guidelines for Nuclear Facilities

IAEA Nuclear Energy Series No. NP-T-3.3

These IAEA guidelines on industrial safety for nuclear facilities are co-sponsored by the International Labour Organization. Specific review of industrial safety practices at nuclear plants have been part of the IAEA OSART (Operational Safety Review Team) missions for decades, and supplementary guidance for such reviews has been available since 1990. This publication presents the latest good practices that nuclear organizations have put into place to implement high quality industrial safety programmes.

English (Forthcoming) | ISBN 978-92-0-101617-1 | STI/PUB/1774 | €60.00

International Conference on Operational Safety

Proceedings of an International Conference Held in Vienna, Austria, 23–26 June 2015

Proceedings Series



This proceedings publication presents the essential content of the 2015 IAEA international conference on the operational safety of nuclear power plants. Although conferences on this topic are conducted regularly, this was the first one after

the earthquake in 2011 that caused the accident at the Fukushima-Daiichi nuclear power plant. The conference brought together a broad range of participants including nuclear utilities, regulators, governments and academia. The topics covered operational safety, culture for safety, effective use of operating experience and the safety of long term operations, amongst others. A fresh perspective was added by representatives of other industries that deal with significant potential hazards. This publication, available exclusively in digital format, provides the reader with the opening and closing addresses, summaries of all sessions and the majority of the papers and posters accepted for the conference.

English (2018) | ISBN 978-92-0-152118-7 | STI/PUB/1826 | €20.00 ∅

Operating Experience Feedback for Nuclear Installations

Specific Safety Guide IAEA Safety Standards Series No. SSG-50

for protecti	ng people and the environment
Opera	ting Experience
Feedb	ack for Nuclear
Installa	auons
Specific	Safety Guide
No. SSG	<u>}-50</u>
(6) IA	EA

A robust operating experience programme prevents or minimizes the risk of future events by learning from events that have already occurred. This Safety Guide provides recommendations for establishing, implementing, assessing and continuously improving an operating experience programme for nuclear installations. The

publication is primarily aimed at operating organizations and regulatory bodies responsible for nuclear installation and describes their roles and responsibilities in the overall operating experience programme. However, this publication is also of relevance to other organizations involved in the design, construction, commissioning, operation and decommissioning of nuclear installations, including technical support organizations, vendor companies, research establishments and universities.

English (45 pp., 2 figs; 2018) | ISBN 978-92-0-100918-0 | STI/PUB/1805 | €30.00

Safety Aspects of Nuclear Power Plants in Human Induced External Events: Assessment of Structures

Safety Reports Series No. 87



This publication provides detailed guidelines for the safety assessment of nuclear power structures against mechanical impact, explosion and fire caused by human induced external events. It covers the characterization of loading, the assessment of structural integrity using both simplified methods and more elaborated methodologies, and the assessment of induced vibration. The acceptance criteria provided in the publication are for different failure modes: overall stability, overall bending and shear, local failure modes and induced vibrations. The process of analysing fire consequences is also included.

English (204 pp., 71 figs; 2018) | ISBN 978-92-0-101117-6 | STI/PUB/1769 | €65.00

Safety Aspects of Nuclear Power Plants in Human Induced External Events: General Considerations

Safety Reports Series No. 86



This publication gives the general roadmap on how to perform the design and evaluation of the protection of nuclear power plants against human induced external hazards, consistent with IAEA safety standards. The publication concentrates on an overall view of the methodology and on the important considerations for its application to existing and new nuclear power plants. Topics covered include elements of the design/evaluation approach, developed in five phases: event identification; load characterization; design and assessment approaches; plant performance assessment and acceptance criteria; and operator response. The publication provides an approach to the assessment of extreme human induced external events which is fully consistent with the methods used for evaluation of nuclear facilities subjected to extreme natural events, such as earthquakes and floods.

English (88 pp., 3 figs; 2017) | ISBN 978-92-0-111015-2 | STI/PUB/1721 | €41.00

Safety Aspects of Nuclear Power Plants in Human Induced External Events: Margin Assessment

Safety Reports Series No. 88



This publication describes the procedures for calculating the margins of nuclear power plants in relation to human induced external hazards. It focuses on plant and systems performance evaluations. A two level approach for margin assessment is provided. The first level consists of a deterministic procedure in which, for each scenario, the existence of at least one undamaged success path to comply with the fundamental safety function is investigated. This procedure can be subsequently extended to calculate probability measures such as conditional core damage probability and the conditional probability of spent fuel damage. In the most elaborated stage, probabilistic aspects of the hazards and of the capacity of structures, systems and components (fragility). Event tree and fault tree models are used to compute PSA metrics, such as core damage frequency, large early release frequency and frequency of spent fuel damage.

English (102 pp., 13 figs; 2017) | ISBN 978-92-0-111415-0 | STI/PUB/1723 | €42.00

Safety of Nuclear Power Plants: Commissioning and Operation

Specific Safety Requirements

IAEA Safety Standards Series No. SSR-2/2 (Rev. 1)



This publication is a revision of IAEA Safety Standards Series No. NS-R-2, Safety of Nuclear Power Plants: Operation, and has been extended to cover the commissioning stage. It describes the requirements to be met to ensure the safe commissioning, operation, and transition from operation to decommissioning of nuclear power plants. Over recent years there have been developments in areas such as long term operation of nuclear power plants, plant ageing, periodic safety review, probabilistic safety analysis review and risk informed decision making processes. It became necessary to revise the IAEA's Safety Requirements in these areas and to correct and/or improve the publication on the basis of feedback from its application by both the IAEA and its Member States. In addition, the requirements are governed by, and must apply, the safety objective and safety Principles. A review of Safety Requirements publications, initiated in 2011 following the accident in the Fukushima Daiichi nuclear power plant in Japan, revealed no significant areas of weakness but resulted in a small set of amendments to strengthen the requirements and facilitate their implementation. These are contained in the present publication.

Arabic (48 pp., 2 figs; 2017) | ISBN 978-92-0-612416-1 | STI/PUB/1716 | €48.00 Chinese (43 pp., 2 figs; 2016) | ISBN 978-92-0-509116-7 | STI/PUB/1716 | €48.00 English (47 pp., 2 figs; 2016) | ISBN 978-92-0-109415-5 | STI/PUB/1716 | €48.00 French (49 pp., 2 figs; 2016) | ISBN 978-92-0-208316-5 | STI/PUB/1716 | €48.00 Russian (58 pp., 2 figs; 2017) | ISBN 978-92-0-408716-1 | STI/PUB/1716 | €48.00 Spanish (51 pp., 2 figs; 2018) | ISBN 978-92-0-300117-5 | STI/PUB/1716 | €48.00

Safety of Nuclear Power Plants: Design

Specific Safety Requirements

IAEA Safety Standards Series No. SSR-2/1 (Rev. 1)



Safety of Nuclear Power Plants: Design

Specific Safety Requirements No. SSR-2/1 (Rev. 1) This publication establishes requirements applicable to the design of nuclear power plants and elaborates on the safety objective, safety principles and concepts that provide the basis for deriving the safety requirements that must be met for the design of a nuclear power plant. It will be useful for organizations involved in design, manufacture, construction, modification, maintenance, operation and decommissioning of nuclear power plants, as well as for regulatory bodies. A review of Safety Requirements publications was commenced in 2011 following the accident in the Fukushima Daiichi nuclear power plant in Japan. The review revealed no significant areas of weakness and resulted in just a small set of amendments to strengthen the requirements and facilitate their implementation, which are contained in the present publication.

 Arabic (68 pp., 2 figs; 2016) | ISBN 978-92-0-600217-9 | STI/PUB/1715 | €50.00

 Chinese (62 pp., 2 figs; 2016) | ISBN 978-92-0-509316-1 | STI/PUB/1715 | €50.00

 English (71 pp., 2 figs; 2016) | ISBN 978-92-0-109315-8 | STI/PUB/1715 | €50.00

 French (75 pp., 2 figs; 2017) | ISBN 978-92-0-208616-6 | STI/PUB/1715 | €50.00

 Russian (83 pp., 2 figs; 2016) | ISBN 978-92-0-409016-1 | STI/PUB/1715 | €50.00

 Spanish (75 pp., 2 figs; 2017) | ISBN 978-92-0-312916-9 | STI/PUB/1715 | €50.00

Severe Accident Mitigation through Improvements in Filtered Containment Vent Systems and Containment Cooling Strategies for Water Cooled Reactors

Proceedings of a Technical Meeting on Severe Accident Mitigation through Improvements in Filtered Containment Venting for Water Cooled Reactors Held in Vienna, Austria, 31 August–3 September 2015

IAEA TECDOC Series No. 1812



One of the most important lessons from the accident at the Fukushima Daiichi nuclear power plant is that a reliable containment venting system can be crucial for effective accident management during severe accidents, especially for smaller volume containments in relation to the rated nuclear power. Containment venting can enhance the capability to maintain core cooling and containment integrity as well as reduce uncontrolled radioactive releases to the environment if the venting system has a filtration capacity. In general, a filtered containment vent system increases the flexibility of plant personnel in coping with unforeseen events. This publication provides the overview of the current status of related activities with the goal to share information between Member States on actions, upgrades, and new technologies pertaining to containment cooling and venting.

English (270 pp., 119 figs; 2017) | ISBN 978-92-0-153817-8 | IAEA-TECDOC-1812 | €18.00

Approaches to Safety Evaluation of New and Existing Research Reactor Facilities in Relation to External Events

Safety Reports Series No. 94

This publication provides information and a framework for Member States to conduct realistic safety evaluation for research reactors in terms of external events. The publication provides information with examples on the use of a graded approach, based on the radiological hazard that a facility poses to the environment, public and workers, and takes into account the lessons from the Fukushima accident. This publication supports the development of site specific guidelines for the actual design and safety assessment, and should be used in conjunction with the relevant IAEA Safety Standards. It can also be used as training material for research reactor staff and for a self-assessment of the vulnerability of existing structures to external events.

English (Forthcoming) | ISBN 978-92-0-102617-0 | STI/PUB/1782 | €40.00

Feasibility Study Preparation for New Research Reactor Programmes

IAEA Nuclear Energy Series No. NG-T-3.18



This publication describes the various elements to be included in a comprehensive, robust and logically structured feasibility study report for a new research reactor project. It provides guidance for the main supporting organization or team of a new research reactor to enable them to undertake an authoritative and comprehensive feasibility study

that could be submitted to decision makers for their review in order to support proposals and endorse an action plan for construction of such a facility. It includes considerations of justification for a new research reactor, associated key nuclear infrastructure issues, cost-benefit analysis and risk management that would have to be addressed prior to authorizations for the establishment of a new research reactor. Addressing these issues will help Member States to develop a comprehensive understanding of all the roles, obligations and commitments involved in establishing and operating a research reactor and ensure that these are met during all phases of the project life cycle. The publication also includes a generic template for preparing a feasibility study report and provides some examples and lessons learned from individual Member States in preparing such studies.

English (33 pp., 5 figs; 2018) | ISBN 978-92-0-104518-8 | STI/PUB/1816 | €30.00

Research Reactors: Safe Management and Effective Utilization

Summary of an International Conference Held in Vienna, 16–20 November 2015

Proceedings Series



The International Conference on Research Reactors: Safe Management and Effective Utilization is the major networking event for the research reactor community worldwide taking place every four years. The multidisciplinary scientific and technological applications that research reactors supported and continue supporting have spawned advances in academia,

industry, medicine, food and agriculture. This publication provides a summary of the conference, the major findings and conclusions of the sessions, and the opening and closing addresses. The accompanying CD-ROM includes the individual technical papers and presentations. These proceedings are expected to serve as a valuable source of information for specialists involved in research reactor operation and utilization as well as for regulatory authorities in the IAEA Member States.

English (66 pp.; 2017) | ISBN 978-92-0-105117-2 | STI/PUB/1793 | €40.00

Safety of Research Reactors

Specific Safety Requirements IAEA Safety Standards Series No. SSR-3



This Safety Requirements publication establishes requirements for all main areas of safety for research reactors, with particular emphasis on requirements for design and operation. It explains the safety objectives and concepts that form the basis for safety and safety assessment for all stages in the lifetime of a research reactor. Technical and administrative requirements for the safety of new research reactors are established in accordance with these objectives and concepts, and they are to be applied to the extent practicable for existing research reactors. The safety requirements established in this publication for the management of safety and regulatory supervision apply to site evaluation, design, manufacturing, construction, commissioning, operation (including utilization and modification), and planning for decommissioning of research reactors (including critical assemblies and subcritical assemblies). The publication is intended for use by regulatory bodies and other organizations with responsibilities in these areas and in safety analysis, verification and review, and the provision of technical support.

 Arabic (123 pp., 2 figs; 2018) | ISBN 978-92-0-609317-7 | STI/PUB/1751 | €58.00

 Chinese (113 pp., 2 figs; 2017) | ISBN 978-92-0-506017-0 | STI/PUB/1751 | €58.00

 English (125 pp., 2 figs; 2016) | ISBN 978-92-0-104816-5 | STI/PUB/1751 | €58.00

 French (135 pp., 2 figs; 2017) | ISBN 978-92-0-203617-8 | STI/PUB/1751 | €58.00

 Russian (153 pp., 2 figs; 2017) | ISBN 978-92-0-405017-2 | STI/PUB/1751 | €58.00

 Russian (153 pp., 2 figs; 2017) | ISBN 978-92-0-405017-2 | STI/PUB/1751 | €58.00

 Spanish (135 pp., 2 figs; 2017) | ISBN 978-92-0-305917-6 | STI/PUB/1751 | €58.00

TRANSPORT OF RADIOACTIVE MATERIAL

Regulations for the Safe Transport of Radioactive Material (2018 Edition)

Specific Safety Requirements

IAEA Safety Standards Series No. SSR-6 (Rev. 1)



The transport of radioactive material is an essential activity worldwide. Both safety and security during transport are matters of national and international importance. This publication is the latest edition of the IAEA Safety Requirements for the safe transport of radioactive material. It is supported by six IAEA Safety Guides which provide explanation and guidance for the SSR-6 requirements to facilitate harmonized implementation. The SSR-6 Regulations apply to the transport of radioactive material by all modes on land, water, or in the air, including transport that is incidental to the use of the radioactive material. Transport comprises all operations and conditions associated with, and involved in, the movement of radioactive material; these include the design, manufacture, maintenance and repair of packaging, and the preparation, consigning, loading, carriage including in-transit storage, unloading and receipt at the final destination of loads of radioactive material and packages. These requirements form an integral part of regulations worldwide, therefore SSR-6 and its associated guidance documents are a requisite source of guidance information for governments, regulators, and all individuals involved in the aforementioned activities of transport of radioactive material.

English (165 pp., 7 figs; 2018) | ISBN 978-92-0-107917-6 | STI/PUB/1798 | €49.00

The Management System for the Safe Transport of Radioactive Material

Safety Guide

IAEA Safety Standards Series No. TS-G-1.4



The purpose of this Safety Guide is to provide information to organizations that are developing, implementing or assessing a management system for activities relating to the transport of radioactive material. Such activities include, but are not limited to, design, fabrication, inspection and testing, maintenance, transport and disposal of radioactive material packaging. This publication is intended to assist those establishing or improving a management system to integrate safety, health, environmental, security, quality and economic elements to ensure that safety is properly taken into account in all activities of the organization.

English (99 pp., 2 figs; 2008) | ISBN 978-92-0-108508-5 | STI/PUB/1352 | €32.00 Russian (116 pp., 2 figs; 2015) | ISBN 978-92-0-404015-9 | STI/PUB/1352 | €32.00 Spanish (107 pp., 2 figs; 2018) | ISBN 978-92-0-300916-4 | STI/PUB/1352 | €32.00

WASTE REPOSITORIES

Generic Post-closure Safety Assessment for Disposal of Disused Sealed Radioactive Sources in Narrow Diameter Boreholes

IAEA TECDOC Series No. 1824



In accordance with the relevant IAEA safety standards, this publication complements IAEA Safety Standards Series No. SSG-1, Borehole Disposal Facilities for Radioactive Waste, by presenting a generic post-closure safety assessment for the IAEA borehole disposal concept of disused sealed radioactive sources in narrow boreholes. All the steps required to conduct such an assessment are covered by providing safety elements to ensure safety at borehole disposal sites. The publication identifies the key safety features, under varying disposal system conditions, in order to support the design and licensing processes of the borehole disposal concept, and facilitate its site specific implementation. The publication is primarily intended for those involved in developing or regulating the disposal of disused sealed radioactive sources to borehole facilities and will be of particular interest to States that have disused sealed radioactive sources but not suitable disposal options at present.

English (320 pp., 32 figs; 2017) | ISBN 978-92-0-107117-0 | IAEA-TECDOC-1824 | €18.00

Model Regulations for Borehole Disposal Facilities for Radioactive Waste

IAEA TECDOC Series No. 1827



This publication is designed to assist in the development of an appropriate set of regulations for the predisposal management and disposal of disused sealed radioactive sources and small volumes of associated radioactive waste using the IAEA borehole disposal concept. It allows States to appraise the adequacy of their existing regulations and regulatory guides, and can be used as a reference by those States developing regulations for the first time. The model regulations set out in this publication will need to be adapted to take account of the existing national legal and regulatory framework and other local conditions in the State.

English (48 pp., 2 figs; 2017) | ISBN 978-92-0-107617-5 | IAEA-TECDOC-1827 | €18.00

RADIATION PROTECTION

Occupational Radiation Protection

General Safety Guide

IAEA Safety Standards Series No. GSG-7



This Safety Guide, prepared jointly by the International Atomic Energy Agency (IAEA) and the International Labour Organization (ILO), provides guidance on fulfilling the requirements of the International Basic Safety Standards (IAEA Safety Standards Series No. GSR Part 3) with respect to occupational exposure. It provides general guidance on the development of occupational radiation protection programmes as appropriate for the sources of radiation likely to be encountered in the workplaces in question to fulfil the management's responsibility for protection and safety. Detailed guidance is also provided on the monitoring and assessment of workers' exposure due to external radiation sources and from intakes of radionuclides. The Safety Guide reflects the current internationally accepted principles and recommended good practices in occupational radiation protection, with account taken of the conceptual changes and technological enhancements that have occurred over the past decade.

English (335 pp., 9 figs; 2018) | ISBN 978-92-0-102917-1 | STI/PUB/1785 | €58.00

Protection of the Public against Exposure Indoors due to Radon and Other Natural Sources of Radiation

Specific Safety Guide

IAEA Safety Standards Series No. SSG-32



This Safety Guide provides recommendations on meeting the requirements established in the IAEA International Basic Safety Standards, for protection of the public against exposure indoors due to natural sources of radiation. Guidance is provided on the application of the requirements for justification and optimization of protection by national authorities in considering control of natural sources of radiation indoors such as radon and radionuclides of natural origin in materials used for the construction of dwellings, offices, industrial premises and other buildings. The Safety Guide provides recommendations and guidance to be followed by the regulatory body and by other authorities and organizations with responsibilities in relation to exposure to radiation from natural sources.

English (90 pp., 4 figs; 2015) | ISBN 978-92-0-102514-2 | STI/PUB/1651 | €45.00 Spanish (98 pp., 4 figs; 2018) | ISBN 978-92-0-302117-3 | STI/PUB/1651 | €45.00

Radiation Protection and Safety in Medical Uses of Ionizing Radiation

Specific Safety Guide

IAEA Safety Standards Series No. SSG-46

This Safety Guide provides recommendations and guidance on fulfilling the requirements of IAEA Safety Standards Series No. GSR Part 3 for ensuring radiation protection and safety of radiation sources in medical uses of ionizing radiation with regard to patients, workers, carers and comforters, volunteers in biomedical research, and the public. It covers radiological procedures in diagnostic radiology (including dentistry), image guided interventional procedures, nuclear medicine, and radiotherapy. Recommendations and guidance are provided on applying a systematic approach to ensure that there is a balance between being able to utilize the benefits from medical uses of ionizing radiation and minimizing the risk of radiation effects to people.

English (318 pp., 2 figs; 2018) | ISBN 978-92-0-101717-8 | STI/PUB/1775 | €54.00

Radiation Protection of the Public and the Environment

Specific Safety Guide

IAEA Safety Standards Series No. GSG-8

IAE for p	A Safety Standards
Ra	diation Protection
of t	he Public and
tne	Environment
6	UNa
Gen	eral Safety Guide
No.	GSG-8

This Safety Guide provides guidance on the implementation of the requirements in the International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, in relation to protection of the public and the environment against radiation risks. It provides generic guidance on the application of the radiation protection principles

of justification, of optimization of protection and safety, and of dose limits. The publication covers the protection of the public and the environment in all exposure situations — planned, emergency and existing.

English (51 pp.; 2018) | ISBN 978-92-0-102517-3 | STI/PUB/1781 | €40.00 Status of Radon Related Activities in Member States Participating in Technical Cooperation Projects in Europe

IAEA TECDOC Series No. 1810

	00000		112	
Status of F Activities i Participatio Cooperatio	ladon Relat n Member S ng in Techn n Projects i	ed States ical in Europe	-3010	

This publication summarizes the status of radon programmes at the start of 2014 in the Member States in Europe participating in the IAEA technical cooperation project on establishing enhanced approaches to the control of public exposure to radon. The current status was determined from responses to a questionnaire covering the following elements of a national radon action plan: policies and strategies: radon measurement surveys; establishment of reference levels; managing radon in existing buildings and in future buildings: education and training of professionals; and public awareness initiatives.

English (196 pp., 2 figs; 2017) | ISBN 978-92-0-100617-2 | IAEA-TECDOC-1810 | €18.00

Arrangements for the Termination of a Nuclear or Radiological Emergency

General Safety Guide

IAEA Safety Standards Series No. GSG-11



This publication provides guidance and recommendations on arrangements to be made at the preparedness stage, as part of overall emergency preparedness, for the termination of a nuclear or radiological emergency and the subsequent transition from the emergency exposure situation to either a planned exposure situation or an existing exposure situation. It elaborates the prerequisites that need to be fulfilled so that responsible authorities can declare the nuclear or radiological emergency ended and it gives detailed guidance on adapting and lifting protective actions. This publication, jointly sponsored by 10

international organizations (FAO, IAEA, ICAO, ILO, IMO, INTERPOL, OECD/NEA, UN OCHA, WHO and WMO) is intended to assist Member States in the application of IAEA Safety Standards Series Nos GSR Part 3 and GSR Part 7.

English (189 pp., 20 figs; 2018) | ISBN 978-92-0-108017-2 | STI/PUB/1796 | €53.00

Leadership, Human Performance and Internal Communication in Nuclear Emergencies

IAEA Nuclear Energy Series No. NG-T-1.5



This publication focuses on the challenges and their possible solutions in the areas of leadership, human performance and internal communication in a severe nuclear emergency. It presents a brief overview of some of the key concepts, especially how they relate to an organization's ability to successfully manage an emergency event. The target audience for this publication are those officials and senior managers dealing with emergency response in the operating organization, government, local authorities and the regulatory body. Those who have an influence on the

style of leadership and personnel development and training that is applied in their organizations and who are involved in emergency preparedness and response will also benefit from this publication.

English (36 pp., 2 figs; 2018) | ISBN 978-92-0-103317-8 | STI/PUB/1789 | €30.00

Management of Large Volumes of Waste Arising in a Nuclear or Radiological Emergency

IAEA TECDOC Series No. 1826



This publication, prepared in light of the IAEA Action Plan on Nuclear Safety developed after the accident at the Fukushima Daiichi nuclear power plant, addresses the management of large volumes of radioactive waste arising in a nuclear or radiological emergency, as part of overall emergency preparedness. The management of large volumes of waste will be one of many efforts to be dealt with to allow recovery of affected areas, to support return of evacuated or relocated populations and preparations for normal social and economic activities, and/or to mitigate additional environmental impacts. The publication is intended to be of use to national planners and policy makers, facility and programme managers, and other professionals responsible for developing and implementing national plans and strategies to manage radioactive waste arising from nuclear or radiological emergencies.

English (102 pp., 6 figs; 2017) | ISBN 978-92-0-107417-1 | IAEA-TECDOC-1826 | €18.00

Preparedness and Response for a Nuclear or Radiological Emergency

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 7



This publication, jointly sponsored by the FAO, IAEA, ICAO, ILO, IMO, INTERPOL, OECD/NEA, PAHO, CTBTO, UNEP, OCHA, WHO and WMO, is the new edition establishing the requirements for preparedness and response for a nuclear or radiological emergency which takes into account the latest experience and developments in the area. It supersedes the previous edition of the Safety Requirements for emergency preparedness and response, Safety Standards Series No. GS-R-2, which was published in 2002. This publication establishes the requirements for ensuring an adequate level of preparedness and response for a nuclear or radiological emergency, irrespective of its cause. These Safety Requirements are intended to be used by governments, emergency response organizations, other authorities at the local, regional and national levels, operating organizations and the regulatory body as well as by relevant international organizations at the international level.

Arabic (109 pp., 2 figs; 2016) | ISBN 978-92-0-609816-5 | STI/PUB/1708 | €45.00 Chinese (91 pp., 2 figs; 2016) | ISBN 978-92-0-506716-2 | STI/PUB/1708 | €45.00 English (102 pp., 2 figs; 2015) | ISBN 978-92-0-105715-0 | STI/PUB/1708 | €45.00 French (110 pp., 2 figs; 2017) | ISBN 978-92-0-205717-3 | STI/PUB/1708 | €45.00 Russian (160 pp., 2 figs; 2016) | ISBN 978-92-0-408916-5 | STI/PUB/1708 | €45.00 Spanish (112 pp., 2 figs; 2018) | ISBN 978-92-0-307517-6 | STI/PUB/1708 | €45.00

The Radiological Accident in Chilca



Under the Convention on Assistance in the Case of a Nuclear or Radiological Emergency, the Peruvian authorities requested assistance from the IAEA in relation to the radiological accident that occurred during non-destructive testing using a nuclear radioactive source in the district of Chilca, Peru, in 2012, This assistance related to dose assessment and medical management of those involved in the accident was provided during 2012 and 2013. The report gives a detailed account and analysis of the event, as well as, the actions taken in order to assist organizations responsible for radiation protection, source safety and emergency preparedness and response in identifying lessons to be learned that may help to prevent similar accidents.

English (113 pp.; 63 figs; 2018) | ISBN 978-92-0-101817-5 | STI/PUB/1776 | €35.00

Contents and Sample Arguments of a Safety Case for Near Surface Disposal of Radioactive Waste

IAEA TECDOC Series No. 1814

AE	A TECDO	IC SERIES	
	Contents Argumer for Near of Radio	s and Sample nts of a Safety (Surface Dispos active Waste	Case Sal
(6)	IAEA		

This publication arises from the results of two projects to assist Member States in understanding and developing safety cases for near-surface radioactive waste disposal facilities. The objective of the publication is to give detailed information on the contents of safety cases for radioactive waste disposal and the types of arguments that may be included. It is written for technical experts preparing a safety case, and decision makers in the regulatory body and government. The publication outlines the key uses and aspects of the safety case, its evolution in parallel with that of the disposal facility, the

key decision steps in the development of the waste disposal facility, the components of the safety case, their place in the Matrix of Arguments for a Safety Case (the MASC matrix), and a detailed description of the development of sample arguments that might be included in a safety case for each of two hypothetical radioactive waste disposal facilities.

English (83 pp., 7 figs; 2017) | ISBN 978-92-0-104517-1 | IAEA-TECDOC-1814 | €18.00



Decommissioning of Facilities

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 6



Decommissioning is the last step in the lifetime management of a facility. It must also be considered during the design, construction, commissioning and operation of facilities. This publication establishes requirements for the safe decommissioning of a broad range of facilities: nuclear power plants, research reactors, nuclear fuel cycle facilities, facilities for processing naturally occurring radioactive material, former military sites, and relevant medical, industrial and research facilities. It addresses all the aspects of decommissioning for decommissioning, conduct of decommissioning actions and termination of the authorization for decommissioning. It is intended for use by those involved in policy development, regulatory control and implementation of decommissioning.

Arabic (25 pp., 2 figs; 2016) | ISBN 978-92-0-600216-2 | STI/PUB/1652 | €25.00 Chinese (19 pp., 2 figs; 2015) | ISBN 978-92-0-510215-3 | STI/PUB/1652 | €25.00 English (23 pp., 2 figs; 2014) | ISBN 978-92-0-102614-9 | STI/PUB/1652 | €25.00 French (25 pp., 2 figs; 2017) | ISBN 978-92-0-205217-8 | STI/PUB/1652 | €25.00 Russian (29 pp., 2 figs; 2015) | ISBN 978-92-0-404515-4 | STI/PUB/1652 | €25.00 Spanish (25 pp., 2 figs; 2017) | ISBN 978-92-0-300417-6 | STI/PUB/1652 | €25.00

Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities

Specific Safety Guide

IAEA Safety Standards Series No. SSG-47



Decommissioning is the last step in the lifetime management of an authorized facility and it must be considered during the design, construction, commissioning and operation of such facilities. This publication provides guidance on how to comply with requirements for the safe decommissioning of nuclear power plants, research reactors, and other nuclear fuel cycle facilities. It addresses all the aspects of decommissioning that are required to ensure safety including: roles and responsibilities, strategy and planning for decommissioning, conduct of decommissioning actions and completion of decommissioning. It is intended for use by those working in policy and strategy development, planning, implementation and regulatory control of decommissioning.

English (99 pp., 1 fig.; 2018) | ISBN 978-92-0-104118-0 | STI/PUB/1812 | €40.00

Management of Large Volumes of Waste Arising in a Nuclear or Radiological Emergency

IAEA TECDOC Series No. 1826

IALA	TECDUC SERI	ES		
N 0 0	Management of L f Waste Arising i r Radiological E	Large Volume in a Nuclear mergency	25	

This publication, prepared in light of the IAEA Action Plan on Nuclear Safety developed after the accident at the Fukushima Daiichi nuclear power plant. addresses the management of large volumes of radioactive waste arising in a nuclear or radiological emergency, as part of overall emergency preparedness. The management of large volumes of waste will be one of many efforts to be dealt with to allow recovery of affected areas, to support return of evacuated or relocated populations and preparations for normal social and economic activities, and/or to mitigate additional environmental impacts. The publication is intended to be of use to national planners and policy makers, facility and programme managers, and other professionals responsible for developing and implementing national plans and strategies to manage radioactive waste arising from nuclear or radiological emergencies.

English (89 pp., 6 figs; 2017) | ISBN 978-92-0-104517-1 | IAEA-TECDOC-1814 | €18.00

Methodologies for Assessing the Induced Activation Source Term for Use in Decommissioning Applications

Safety Reports Series No. 95

For proper planning and safe implementation of decommissioning of facilities, an accurate estimate of the radioactive inventory of the facility is needed (i.e. source term determination). The largest fraction of this inventory for nuclear power plants, research reactors and accelerator facilities is created by induced activation by neutrons or other particles (protons, electrons, ions). This publication provides information for facility operators and regulatory authorities involved in decommissioning planning and oversight of the process of assessment of the induced activation source term of a facility. It provides information on the selection and application of methodologies for the assessment of the induced activation source term for decommissioning purposes and provides an overview of approaches and practices currently available.

English (Forthcoming) | ISBN 978-92-0-102918-8 | STI/PUB/1823 | €46.00

Model Regulations for Decommissioning of Facilities

IAEA TECDOC Series No. 1816

and finite of
(AEA-TECODE-1818
for of Facilities

The IAEA has systematic programmes to provide Member States with the guidance, services and training necessary for establishing a legal and regulatory framework for the safe use of nuclear technologies, including the planning and implementation of decommissioning. The model regulations provided in this publication cover all aspects of the planning, conduct and termination of the decommissioning of facilities and management of the associated waste, in accordance with the relevant requirements of the IAEA safety standards. They provide a framework for

establishing regulatory requirements and conditions of authorization to be incorporated into individual authorizations for the decommissioning of specific facilities. The model regulations also establish criteria to be used for assessing compliance with regulatory requirements. The publication will be of assistance to Member States in appraising the adequacy of their existing regulations and regulatory guides, and serves as a reference for those Member States developing regulations for the first time.

English (67 pp.; 2017) | ISBN 978-92-0-104817-2 | IAEA-TECDOC-1816 | €18.00

Predisposal Management of Radioactive Waste from the Use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education

Specific Safety Guide

IAEA Safety Standards Series No. SSG-45



This Safety Guide is applicable to the predisposal management of radioactive waste derived from the use of radioactive materials in medicine, industry, agriculture, research and education, including disused sealed radioactive sources. It focuses on waste generated at facilities such as hospitals and research centres, where radioactive waste is not usually generated in bulk quantities. It covers the managerial, administrative and technical issues associated with the safe management of radioactive waste, from its generation to its acceptance at a disposal facility or its release from regulatory control.

English (Forthcoming) | ISBN 92-0-111316-0 | STI/PUB/1758 | €40.00

SAFETY ANALYSIS

Assessment of Equipment Capability to Perform Reliably under Severe Accident Conditions

IAEA TECDOC Series No. 1818



The experience from the last 40 years has shown that severe accidents can subject electrical and instrumentation and control (I&C) equipment to environmental conditions exceeding the equipment's original design basis assumptions. Severe accident conditions can then cause rapid degradation or damage to various degrees up to complete failure of such equipment. This publication provides the technical basis to consider when assessing the capability of electrical and I&C equipment to perform reliably during a severe accident. It provides examples of calculation tools to determine the environmental parameters as well as examples and methods that Member States can apply to assess equipment reliability.

English (127 pp., 48 figs; 2017) | ISBN 978-92-0-104917-9 | IAEA-TECDOC-1818 | €18.00

Best Practices in Physics Based Fault Rupture Models for Seismic Hazard Assessment of Nuclear Installations

Proceedings of a Workshop Held in Vienna, 18-20 November 2015

IAEA TECDOC Series No. 1833

		MEAT	10000-00-
Best Prac	tices in P	hysics	
Based Fa	ult Ruptu	re Model:	5
for Seism	iic Hazard	1	
Assessmi	ent of		
Nuclear II	nstallation	ns	

These proceedings present the outcomes of a workshop convened by the IAEA in 2015. The workshop brought together experts in seismology and earthquake engineering to discuss the applicability of the so called physics-based fault rupture models to generate synthetic earthquake ground motion data for meaningful extrapolation of ground motion prediction in areas where there is a lack of sufficient observations. Fault rupture modelling is recommended for estimating strong motion in cases where nearby faults contribute significantly to the seismic hazard for nuclear installations. The overall aspects and process of the modelling and ground motion simulation are described in IAEA Safety Standards Series No. SSG-9, published in 2010. However, after the massive earthquake

in Japan in 2011, there has been further progress in physics-based fault rupture modelling. Therefore, the IAEA arranged this workshop and the publication arising from it. The intention is to provide practical, up-to-date guidance contributing to effective seismic hazard analysis.

English (2018) | ISBN 978-92-0-158917-0 | IAEA-TECDOC-CD-1833 | €18.00 🖗

Consideration of External Hazards in Probabilistic Safety Assessment for Single Unit and Multi-unit Nuclear Power Plants

Safety Reports Series No. 92

This publication outlines the generic methodology for probabilistic safety assessment (PSA) of nuclear power plants (NPPs) against external hazards. It integrates design, procedural, operational, human factors and both protection and mitigation aspects that are essential to model a NPP response to an external hazard and to assess the associated risk. It specifically addresses the identification and screening of external hazards considering the multi-unit impact.

English (68 pp.; 2018) | ISBN 978-92-0-101917-2 | STI/PUB/1777 | €40.00



Performance of Models in Radiological Impact Assessment for Normal Operation

Report of Working Group 1

Reference Methodologies for Controlling Discharges of Routine Releases of EMRAS II Topical Heading Reference Approaches for Human Dose Assessment

IAEA TECDOC Series No. 1808



This publication provides the results from Working Group 1, on Reference Methodologies for Controlling Discharges of Routine Releases, of the IAEA's EMRAS II (Environmental Modelling for Radiation Safety) programme, which ran from 2009 to 2011. This Working Group carried out an intercomparison of methods used for assessing radiological impacts to people and the environment due to authorized releases of radionuclides during normal operation of nuclear facilities. Three important types of exposure scenarios were considered, those related to atmospheric, marine and river releases. The publication describes the details of the hypothetical radioactive release scenarios, the environmental pathways considered, the environmental transfer models applied, the calculation methods and the results obtained. An analysis of the results and the main findings and conclusions relevant for the use of the described input data and methodologies in regulatory applications is included. The publication also presents considerations on selection of the 'representative person' and

a summary of the different approaches in some States for the regulatory control of radioactive discharges. Input data is included in the annex.

English (98 pp., 15 figs; 2017) | ISBN 978-92-0-112616-0 | IAEA-TECDOC-1808 | €18.00

Prospective Radiological Environmental Impact Assessment for Facilities and Activities

General Safety Guide

IAEA Safety Standards Series No. GSG-10



This Safety Guide provides recommendations and guidance on a general framework for performing prospective radiological impact assessments for facilities and activities, to estimate and control the radiological effects on the public and on the environment. This radiological environmental impact assessment is intended for planned exposure situations as part of the authorization process and, when applicable, as part of a governmental decision making process for facilities and activities. The situations covered in the assessment include both exposures expected to occur in normal operation as well as potential exposures. The assessment of the radiological impacts includes consideration of the risk of radiation effects for humans and for populations of non-human biota. Guidance is provided on the assumptions and input data to be used, the necessary models for environmental transfer and radiation dose assessment and the definition and use of criteria for informing decisions.

English (82 pp., 5 figs; 2018) | ISBN 978-92-0-102518-0 | STI/PUB/1819 | €42.00

Safety Assessment for Facilities and Activities

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 4 (Rev. 1)



This publication describes the generally applicable requirements to be fulfilled in safety assessments for facilities and activities, with special attention paid to defence in depth, quantitative analyses and the application of a graded approach to the range of facilities and activities that are addressed. The requirements provide a consistent and coherent basis for safety assessments, facilitating the transfer of good practices between organizations. A review of Safety Requirements publications was commenced in 2011 following the accident in the Fukushima Daiichi nuclear power plant in Japan. The review revealed no significant areas of weakness and resulted in just a small set of amendments to strengthen the requirements and facilitate their implementation, which are contained in the present publication.

Arabic (38 pp., 3 figs; 2016) | ISBN 978-92-0-612816-9 | STI/PUB/1714 | €49.00 Chinese (34 pp., 3 figs; 2016) | ISBN 978-92-0-510116-3 | STI/PUB/1714 | €49.00 English (38 pp., 3 figs; 2016) | ISBN 978-92-0-109115-4 | STI/PUB/1714 | €49.00 French (40 pp., 3 figs; 2017) | ISBN 978-92-0-212216-1 | STI/PUB/1714 | €49.00 Russian (46 pp., 3 figs; 2016) | ISBN 978-92-0-408816-8 | STI/PUB/1714 | €49.00 Spanish (42 pp., 3 figs; 2018) | ISBN 978-92-0-312016-6 | STI/PUB/1714 | €49.00

Technical Approach to Probabilistic Safety Assessment for Multi-Units

Safety Reports Series No. 96

The technical approach described in this publication builds on the use of a single unit probabilistic safety assessment (PSA) and identifies considerations that are needed from the multi-unit perspective. This is the first attempt to expand the current PSA process to take account of multi-unit issues, and has been done by distilling lessons learned from the Fukushima Daiichi accident and other multi-unit events, and by reviewing previous PSAs and supporting research that have addressed the risks of multi-unit accidents. The publication provides a roadmap and methodology for performing a multi-unit PSA, proposes a set of site level risk metrics, and presents examples of approaches to resolve specific issues.

English (Forthcoming) | ISBN 978-92-0-102618-7 | STI/PUB/1820 | €70.00
Communication and Consultation with Interested Parties by the Regulatory Body

General Safety Guide

IAEA Safety Standards Series No. GSG-6



This Safety Guide provides recommendations on meeting the safety requirements concerning communication and consultation with the public and other interested parties by the regulatory body about the possible radiation risks associated with facilities and activities, and about processes and decisions of the regulatory body. The Safety Guide can be used by authorized parties in circumstances where there are regulatory requirements placed on them for communication and consultation. It may also be used by other organizations or individuals considering their responsibilities for communication and consultation with interested parties.

English (45 pp., 3 figs; 2017) | ISBN 978-92-0-102817-4 | STI/PUB/1784 | €30.00

Functions and Processes of the Regulatory Body for Safety

General Safety Guide

IAEA Safety Standards Series No. GSG-13



This Safety Guide provides recommendations on meeting the requirements of IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), Governmental, Legal and Regulatory Framework for Safety, on the regulatory body's core functions and associated regulatory processes. This guidance is particularly important for regulatory bodies having responsibilities covering a range of facilities and activities that give rise to radiation risks and the important organizational interfaces between various regulatory authorities, which require effective coordination and cooperation. It promotes a consistent approach to regulatory bodies but will addresses the release of facilities and activities from regulatory control including sites, buildings, equipment and material. The publication is intended to be used mainly by regulatory bodies but will also be useful for governments that are developing a regulatory framework for safety. It will also assist authorized parties and others dealing with radiation sources in understanding regulatory procedures, processes and expectations.

English (137 pp., 2 figs; 2018) | ISBN 978-92-0-100718-6 | STI/PUB/1804 | €52.00

Governmental, Legal and Regulatory Framework for Safety

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 1 (Rev. 1)



This publication establishes requirements in respect of the governmental, legal and regulatory framework for safety. It covers the essential aspects of the framework for establishing a regulatory body and taking other actions necessary to ensure the effective regulatory control of facilities and activities utilized for peaceful purposes. Other responsibilities and functions, such as liaison within the global safety regime and on support services for safety (including radiation protection), emergency preparedness and response, nuclear security, and the State system of accounting for and control of nuclear material, are also covered. A review of Safety Requirements publications was commenced in 2011 following the accident in the Fukushima Daiichi nuclear power plant in Japan. The review revealed no significant areas of weakness and resulted in just a small set of amendments to strengthen the requirements and facilitate their implementation, which are contained in the present publication.

Arabic (40 pp., 2 figs; 2016) | ISBN 978-92-0-611216-8 | STI/PUB/1713 | €48.00 Chinese (36 pp., 2 figs; 2016) | ISBN 978-92-0-509716-9 | STI/PUB/1713 | €48.00 English (42 pp., 2 figs; 2016) | ISBN 978-92-0-108815-4 | STI/PUB/1713 | €48.00 French (42 pp., 2 figs; 2017) | ISBN 978-92-0-208016-4 | STI/PUB/1713 | €48.00 Russian (49 pp., 2 figs; 2016) | ISBN 978-92-0-409516-6 | STI/PUB/1713 | €48.00 Spanish (44 pp., 2 figs; 2017) | ISBN 978-92-0-311116-4 | STI/PUB/1713 | €48.00

International Conference on Effective Nuclear Regulatory Systems: Sustaining Improvements Globally

Proceedings of an International Conference Held in Vienna, Austria, 11–15 April 2016

Proceedings Series



This publication is the proceedings of the fourth in a series of conferences convened by the IAEA on effective nuclear regulatory systems. The conference brought together senior regulators in the areas of nuclear and radiation safety as well as nuclear security from around the world to discuss how to improve regulatory effectiveness to ensure the protection of the public and the environment. The conference built upon the conclusions and deliberations of the past to review issues that are important to the global nuclear regulatory community. These proceedings include the opening addresses, the session summaries, and the President's summary and conclusions of the conference. The attached CD-ROM contains all the papers from the conference that were made available for publication.

English (40 pp.; 2017) | ISBN 978-92-0-103417-5 | STI/PUB/1790 | €40.00

Organization, Management and Staffing of the Regulatory Body for Safety

General Safety Guide

IAEA Safety Standards Series No. GSG-12



This publication provides recommendations on meeting the requirements of IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), Governmental, Legal and Regulatory Framework for Safety, in respect of the organizational structure, management and staffing of the regulatory body. It addresses the arrangements and processes regulatory bodies need to consider in carrying out their responsibilities and functions efficiently and effectively and in an independent manner. It also provides guidance on how an integrated management system should be established and implemented in order to have in place both the core processes that help the regulatory body to perform its core functions, and the management and support processes that are necessary to run the regulatory body. The publication is intended for use by all regulatory bodies, irrespective of the size and type of facilities and activities they regulate.

English (124 pp.; 2018) | ISBN 978-92-0-100218-1 | STI/PUB/1801 | €50.00

Regulatory Control of Radioactive Discharges to the Environment

General Safety Guide

IAEA Safety Standards Series No. GSG-9



This Safety Guide is intended to assist governments, regulatory bodies, applicants for a licence and operating organizations with a structured approach to controlling radiation exposures of the public resulting from discharges from normal operations of facilities and activities, and with the optimization of protection and safety. More specifically, this publication addresses the process for authorization of discharges from new and modified facilities or activities, and the review of established authorizations. The guidance applies to different types of facilities, which range from nuclear installations to applications of radioisotopes in industry, medicine and research. It also covers the controllable releases to the environment in normal operation that may result from the mining and processing of ores for the extraction of uranium or thorium as part of the nuclear fuel cycle and discharges of naturally occurring radioactive material in non-nuclear industries.

English (71 pp., 5 figs; 2018) | ISBN 978-92-0-102418-3 | STI/PUB/1818 | €42.00

Regulatory Oversight of Human and Organizational Factors for Safety of Nuclear Installations

IAEA TECDOC Series No. 1846



Written for use by regulatory bodies and their technical support organizations, and those individuals supporting human performance activities and programmes, this publication addresses the definition and implementation of an oversight programme that adequately takes into account human and organizational factors (HOF) to oversee safety throughout the lifetime of nuclear installations. A key concept is that safety is the result of interaction between humans, technology and the organization. Based on the outcome of several international meetings, this publication presents the main elements to be used to enhance regulatory oversight capabilities and describes the essential concepts and terms used in the area of HOF. It is intended to help in the development of regulations and guides related to HOF, stressing the key role of the licensee's management system in establishing and maintaining conditions to support people at work. The TECDOC describes ways to verify compliance with regulatory requirements related to HOF, as well as ways to better understand HOF trends and conclusions, using an integrated safety assessment approach.

English (66 pp., 3 figs; 2018) | ISBN 978-92-0-103318-5 | IAEA-TECDOC-1846 | €18.00

Technical and Scientific Support Organizations Providing Support to Regulatory Functions

IAEA TECDOC Series No. 1835



This publication introduces the general principles underlying the provision of technical and scientific support to a regulatory body and the characteristics of organizations providing such support. It describes the services provided to support regulatory functions as well as the associated activities and processes to maintain the needed level of expertise, state of the art tools and equipment. It is the first IAEA publication dedicated to the specific practices and challenges to be met by the technical and scientific support organizations.

English (64 pp., 6 figs; 2018) | ISBN 978-92-0-109117-8 | IAEA-TECDOC-1835 | €18.00





NUCLEAR SECURITY



Building Capacity for Nuclear Security

Implementing Guide

IAEA Nuclear Security Series No. 31-G



Each State has the primary responsibility to build the capacity of organizations and people in order to develop, implement, and sustain a nuclear security regime. To discharge its responsibilities, the State has to strengthen its capacity at national, organisational and individual levels. Specifically, the State has to be able to enhance the competences and capabilities of relevant stakeholders in fulfilling their responsibilities within the nuclear security regime. Such endeavour involves various elements in capacity building, ranging from education and training to the development of knowledge network. This publication is intended to serve as a reference document for Member States to develop a national capacity building strategy for nuclear security. It addresses all organizations involved in nuclear security and reflects the multidisciplinary and cross-institutional nature of this task, as well as the long term efforts that are required.

English (62 pp; 2018) | ISBN 978-92-0-111916-2 | STI/PUB/1764 | €40.00

Computer Security Incident Response Planning at Nuclear Facilities



The purpose of this publication is to assist Member States in developing comprehensive contingency plans for computer security incidents with the potential to impact nuclear security and/or nuclear safety. It provides an outline and recommendations for establishing a computer security incident response capability as part of a computer security programme, and considers the roles and responsibilities of the system owner, operator, competent authority, and national technical authority in responding to a computer security incident with possible nuclear security repercussions.

English (62 pp., 4 figs; 2016) | ISBN 978-92-0-104416-7 | IAEA-TDL-005 | €18.00 Spanish (66 pp., 4 figs; 2018) | ISBN 978-92-0-306717-1 | IAEA-TDL-005 | €18.00

Computer Security of Instrumentation and Control Systems at Nuclear Facilities

Technical Guidance

IAEA Nuclear Security Series No. 33-T



Computer Security as a discipline is challenged by increasing threat vectors targeting a dynamic technological environment. This publication establishes guidance addressing the challenge of applying computer security measures to instrumentation and control (I&C) systems at nuclear facilities. The measures are intended to protect these I&C systems throughout their entire lifecycles against malicious acts perpetrated by threat actors. The technical basis and methodologies for the application of these computer security measures are considered. The publication also addresses the application of such measures to the development, simulation and maintenance environments of these I&C systems. In addition, account is taken of developments in human factors engineering and nuclear safety. This Technical Guide references and takes into account other Safety Guides and IAEA Nuclear Security Series publications that provide guidance relating to I&C design.

English (58 pp.; 2018) | ISBN 978-92-0-103117-4 | STI/PUB/1787 | €42.00

Conducting Computer Security Assessments at Nuclear Facilities



Computer security is increasingly recognized as a key component in nuclear security. As technology advances, it is anticipated that computer and computing systems will be used to an even greater degree in all aspects of plant operations including safety and security systems. A rigorous and comprehensive assessment process can assist in strengthening the effectiveness of the computer security programme. This publication outlines a methodology for conducting computer security assessments at nuclear facilities. The methodology can likewise be easily adapted to provide assessments at facilities with other radioactive materials.

English (64 pp., 4 figs; 2016) | ISBN 978-92-0-104616-1 | IAEA-TDL-006 | €18.00 French (69 pp., 4 figs; 2018) | ISBN 978-92-0-206517-8 | IAEA-TDL-006 | €18.00 Russian (73 pp., 4 figs; 2018) | ISBN 978-92-0-408317-0 | IAEA-TDL-006 | €18.00 Spanish (68 pp., 4 figs; 2018) | ISBN 978-92-0-306617-4 | IAEA-TDL-006 | €18.00

Developing Regulations and Associated Administrative Measures for Nuclear Security

Implementing Guide

IAEA Nuclear Security Series No. 29-G



This publication aims to assist States to identify the responsibilities of those involved in nuclear security so that suitable regulations, agreements and associated administrative measures may be developed for establishing and sustaining an effective nuclear security regime. The publication is structured to provide an overview of the most important aspects to be covered by a State's legislative and regulatory framework for governing nuclear security. States may therefore use this publication to undertake a gap analysis of their legislative and regulatory framework for nuclear security in order to take actions to update their framework as necessary.

English (60 pp.; 2018) | ISBN 978-92-0-111716-8 | STI/PUB/1762 | €39.00

Establishing a System for Control of Nuclear Material for Nuclear Security Purposes at a Facility during Use, Storage and Movement

Technical Guidance

IAEA Nuclear Security Series No. 32-T

Control of nuclear material comprises the administrative and technical measures applied to ensure that nuclear material is not misused or removed from its assigned location without approval and/or without proper accounting. This publication, which builds upon the Implementing Guide IAEA Nuclear Security Series No. 25-G, focuses on the control of nuclear material during storage, use and movement using a facility's nuclear material accounting and control (NMAC) system. It describes practical measures for controlling nuclear material for nuclear security purposes during all activities at a facility, including movements, and how to use a graded approach in applying such measures. The technical guidance provided is targeted at States and their competent authorities on how to use individual elements of the NMAC system, but will be also useful for persons responsible for designing, operating and assessing nuclear security systems, physical protection of nuclear facilities, nuclear security management, operators and managers of NMAC systems; as well as for those preparing associated regulations; and persons responsible for computer security at nuclear facilities.

English (Forthcoming) | ISBN 978-92-0-103017-7 | STI/PUB/1786 | €38.00

Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme

Implementing Guide

IAEA Nuclear Security Series No. 19



This publication provides guidance on the actions to be taken by a State in implementing an effective nuclear security infrastructure for a nuclear power programme. The topics covered are: development of national policy and strategy; common nuclear security measures; infrastructure issues relating to nuclear and other radioactive material; associated facilities; and cooperation with other States. The guidance provided is intended primarily for use by national policy makers, national legislators, competent authorities, institutions and individuals involved in the establishment, implementation, maintenance or sustainability of the nuclear security infrastructure for a nuclear power programme.

Arabic (79 pp., 1 fig.; 2015) | ISBN 978-92-0-609515-7 | STI/PUB/1591 | €29.00 English (73 pp., 1 fig.; 2013) | ISBN 978-92-0-138010-4 | STI/PUB/1591 | €29.00 French (89 pp., 1 fig.; 2018) | ISBN 978-92-0-206817-9 | STI/PUB/1591 | €29.00 Spanish (89 pp., 1 fig.; 2018) | ISBN 978-92-0-310516-3 | STI/PUB/1591 | €29.00

Identification of High Confidence Nuclear Forensics Signatures

Results of a Coordinated Research Project and Related Research

IAEA TECDOC Series No. 1820



This publication presents the results of a Coordinated Research Project and related research on the identification of high confidence nuclear forensic isotopic, chemical and physical data characteristics or signatures and provides information on signatures that can help identify the origin and history of nuclear and other radioactive material encountered out of regulatory control. This research report compiles findings from investigations of materials obtained from throughout the nuclear fuel cycle to include radioactive sources. The report further provides recent results used to identify, analyse in the laboratory, predict and interpret these signatures relative to the requirements of a nuclear forensics examination. The report describes some of the controls on the incorporation and persistence of these signatures in these materials as well as their potential use in a national system of identification to include a national nuclear forensics library.

English (128 pp., 57 figs; 2017) | ISBN 978-92-0-105617-7 | IAEA-TECDOC-1820 | €18.00

International Conference on Nuclear Security: Commitments and Actions

Summary of an International Conference Held in Vienna, 5–9 December 2016

Proceedings Series



This publication presents the proceedings of an international conference in the field of nuclear security, which took place at the IAEA Headquarters in Vienna from 5–9 December 2016. The conference was convened to discuss the international community's experiences and achievements in strengthening nuclear security, to enhance understanding of current approaches to nuclear security worldwide, to identify trends and to provide an inclusive forum at which ministers, policy makers, senior officials and nuclear security experts could formulate and exchange views on future directions and priorities for nuclear security. The publication contains the President's summary of the conference, a summary of the ministerial segment, the full text of the ministerial declaration adopted by the conference, statements from the opening and closing sessions, an outline of the conference programme and a list of invited contributions. For the first time, the IAEA invited students and young professionals to submit an essay on a topic related to the conference for review by a panel of international judges.

three winning essays are reproduced in this publication. The attached CD-ROM contains the full conference programme, the list of conference participants, the national statements from the ministerial segment, and a selection of papers and presentations from the conference.

English (84 pp.; 2017) | ISBN 978-92-0-107017-3 | STI/PUB/1794 | €28.00

Nuclear Security Culture

Implementing Guide IAEA Nuclear Security Series No. 7



This publication defines the basic concepts and elements of nuclear security culture, with the aim of providing Member States with international consensus guidance on planning and implementing a programme to improve nuclear security culture. Particular emphasis is placed on areas such as regulation, government institutions and general public awareness. The report provides an overview of the necessary attributes of an effective nuclear security culture and emphasizes that its success is ultimately dependent on individuals: policy makers, regulators, managers, individual employees and, to a certain extent, members of the general public. Practical methods to assess and improve the effectiveness of security culture are also included.

Arabic (43 pp., 2 figs; 2012) | ISBN 978-92-0-623810-3 | STI/PUB/1347 | €30.00 Chinese (36 pp., 2 figs; 2012) | ISBN 978-92-0-526410-3 | STI/PUB/1347 | €30.00 English (37 pp., 2 figs; 2008) | ISBN 978-92-0-107808-7 | STI/PUB/1347 | €30.00 French (41 pp., 2 figs; 2009) | ISBN 978-92-0-206509-3 | STI/PUB/1347 | €30.00 Spanish (41 pp., 2 figs; 2017) | ISBN 978-92-0-310616-0 | STI/PUB/1347 | €30.00

Nuclear Security Systems and Measures for Major Public Events

Implementing Guide

IAEA Nuclear Security Series No. 18



This publication provides an overview, based on practical experience and lessons learned, for establishing nuclear security systems and measures for major public events. It covers technical and administrative nuclear security measures for developing the necessary organizational structure, developing plans, strategies and concepts of operations, and making arrangements for implementing the developed plans, strategies and concepts.

Arabic (60 pp., 14 figs; 2016) | ISBN 978-92-0-610716-4 | STI/PUB/1546 | €30.00 English (56 pp., 14 figs; 2012) | ISBN 978-92-0-127010-8 | STI/PUB/1546 | €30.00 French (62 pp., 14 figs; 2017) | ISBN 978-92-0-208416-2 | STI/PUB/1546 | €30.00 Russian (67 pp., 14 figs; 2014) | ISBN 978-92-0-401414-3 | STI/PUB/1546 | €30.00 Spanish (62 pp., 14 figs; 2018) | ISBN 978-92-0-305317-4 | STI/PUB/1546 | €30.00

Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5)

Implementing Guide

IAEA Nuclear Security Series No. 27-G



This publication is the lead Implementing Guide in a suite of guidance on implementing the Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13. It provides guidance and suggestions to assist States and their competent authorities in establishing, strengthening and sustaining their national physical protection regime and implementing the associated systems and measures, including operators' physical protection systems.

English (120 pp., 7 figs; 2018) | ISBN 978-92-0-111516-4 | STI/PUB/1760 | €46.00

Radiological Crime Scene Management

Implementing Guide

IAEA Nuclear Security Series No. 22-G



Radiological crime scene management is the process used to ensure safe, secure, effective and efficient operations at a crime scene where nuclear or other radioactive materials are known, or suspected, to be present. Managing a radiological crime scene is a key part of responding to a nuclear security event. Evidence collection at radiological crime scenes may share a wide range of characteristics with that at conventional crime scenes, such as evidence search patterns, geographical scene modelling and evidence recording, whether or not explosives are involved. This publication focuses on the framework and functional elements for managing a radiological crime scene that are distinct from any other crime scene. It assumes that states have a capability for managing conventional crime scenes.

Arabic (93 pp., 25 figs; 2017) | ISBN 978-92-0-604217-5 | STI/PUB/1672 | €48.00 English (93 pp., 25 figs; 2014) | ISBN 978-92-0-108714-0 | STI/PUB/1672 | €48.00

Security of Nuclear Information

Implementing Guide IAEA Nuclear Security Series No. 23-G



This publication provides guidance on implementing the principle of confidentiality and on the broader aspects of information security (i.e. integrity and availability). It assists States in bridging the gap between existing government and industry standards on information security, the particular concepts and considerations that apply to nuclear security and the special provisions and conditions that exist when dealing with nuclear material and other radioactive material. Specifically it seeks to assist States in the identification, classification, and assignment of appropriate security controls to

information that could adversely impact nuclear security if compromised.

Arabic (58 pp.; 2016) | ISBN 978-92-0-612316-4 | STI/PUB/1677 | €30.00 English (54 pp.; 2015) | ISBN 978-92-0-110614-8 | STI/PUB/1677 | €30.00 French (60 pp.; 2017) | ISBN 978-92-0-204317-6 | STI/PUB/1677 | €30.00 Spanish (Forthcoming) | ISBN 978-92-0-305417-1 | STI/PUB/1677 | €30.00

Self-assessment of Nuclear Security Culture in Facilities and Activities

Technical Guidance

IAEA Nuclear Security Series No. 28-T



The IAEA has developed a comprehensive methodology for evaluating nuclear security culture. When implemented by a State, this methodology will help to make nuclear security culture sustainable. It will also promote cooperation and the sharing of good practices related to nuclear security culture. This publication is the first guidance for assessing nuclear security culture and analysing its strengths and weaknesses within a facility or activity, or an organization. It reflects, within the context of assessment, the nuclear security culture model, principles and criteria set out in the Implementing Guide, IAEA Nuclear Security Series No. 7. This guidance will be useful for organizations and operating facilities in conducting the self-assessment of nuclear security culture by providing practical methods and tools. It will also help regulatory bodies and other competent authorities to understand the self-assessment methodology used by operators, encourage operators to start the self-assessment process or, if appropriate, conduct independent assessments of nuclear security culture.

English (107 pp., 8 figs; 2017) | ISBN 978-92-0-111616-1 | STI/PUB/1761 | €55.00

Sustaining a Nuclear Security Regime

Implementing Guide

IAEA Nuclear Security Series No. 30-G



This publication addresses the sustainability of all aspects of a national nuclear security regime, including those relating to nuclear material and nuclear facilities, other radioactive material and associated facilities, and nuclear and other radioactive material out of regulatory control. The publication is relevant for States that have established a nuclear security regime as well as for

States that are in the process of establishing one. It includes guidance on how to address challenges in sustaining a nuclear security regime over time. It also addresses the initial development and implementation of the regime, particularly where sustainability can be built into it as part of its design.

English (26 pp.; 2018) | ISBN 978-92-0-111816-5 | STI/PUB/1763 | €25.00

Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities

Implementing Guide

IAEA Nuclear Security Series No. 25-G



Nuclear material accounting and control (NMAC) measures are designed to protect nuclear facilities and nuclear material from adversaries such as non-State actors both inside and outside the nuclear facility. This publication focuses on measures to prevent and mitigate the risk posed by insider threats. It describes elements of a programme that can be implemented at a nuclear facility

in coordination with other systems existing at the facility level, such as operations, measurements and physical protection, for the purpose of deterring and detecting unauthorized removal of nuclear material.

Arabic (65 pp.; 2018) | ISBN 978-92-0-609017-6 | STI/PUB/1685 | €30.00 English (63 pp.; 2015) | ISBN 978-92-0-101915-8 | STI/PUB/1685 | €30.00



Nuclear Power Planning and Economics, Nuclear Power Operations, Reactor Technology, Quality Assurance, Qualification and Training of Personnel

NUCLEAR POWER



Country Nuclear Power Profiles

2018 Edition



The Country Nuclear Power Profiles (CNPP) publication compiles background information on the status and development of nuclear power programmes across participating International Atomic Energy Agency (IAEA) Member States. The publication summarizes organizational and industrial aspects of nuclear power programmes and provides information about the relevant legislative, regulatory and international framework in each participating State. The descriptive and statistical overview of the economic, energy and electricity situation in each State and its nuclear power framework is intended to serve as an integrated source of key background information about nuclear power programmes throughout the world. This 2018 edition contains updated country information for

37 out of 50 participating Member States.

English (2018) | ISBN 978-92-0-157718-4 | IAEA-CNPP/2018/CD | €95.00 ()

Industrial Applications of Nuclear Energy

IAEA Nuclear Energy Series No. NP-T-4.3

	No. NP-1-4.3
	Industrial Applications of Nuclear Energy
Rentes	
Reduced Reports	-

This publication provides a detailed overview of the potential use of nuclear energy for industrial systems and/ or processes which have a strong demand for process heat/steam and power, and on the mapping of nuclear power reactors proposed for various industrial applications. It describes the technical concepts

for combined nuclear--industrial complexes that are being pursued in various Member States, and presents the concepts that were developed in the past to be applied in connection with some major industries. It also provides an analysis of the energy demand in various industries and outlines the potential that nuclear energy may have in major industrial applications such as process steam for oil recovery and refineries, hydrogen generation, and steel and aluminium production. The audience for this publication includes academia, industry, and government agencies.

English (80 pp., 32 figs; 2017) | ISBN 978-92-0-101417-7 | STI/PUB/1772 | ${\in}59.00$

Nuclear Power Reactors in the World

2018 Edition

Reference Data Series No. 2



This is the 38th edition of Reference Data Series No. 2, which presents the most recent reactor data available to the IAEA. It contains summarized information as of the end of 2017 on power reactors operating, under construction and shut down as well as performance data on reactors operating in the IAEA Member States. The information is collected through designated national correspondents in the Member States and the data are used to

maintain the IAEA's Power Reactor Information System (PRIS).

English (79 pp., 6 figs; 2018) | ISBN 978-92-0-101418-4 | IAEA-RDS-2/38 | €18.00

Opportunities for Cogeneration with Nuclear Energy

IAEA Nuclear Energy Series No. NP-T-4.1



This publication presents a comprehensive overview of various aspects relating to the application of cogeneration with nuclear energy, which may offer advantages such as increased efficiency, better cost effectiveness, and reduced environmental impact. The publication provides details on experiences, best practices and expectations for the foreseeable future of cogeneration with nuclear power technology and serves as a guide that supports newcomer countries. It includes information on systems and applications in various sectors, feasibility aspects, technical and economic details, and case studies.

English (91 pp., 32 figs; 2017) | ISBN 978-92-0-103616-2 | STI/PUB/1749 | €58.00

Strategic Environmental Assessment for Nuclear Power Programmes: Guidelines

IAEA Nuclear Energy Series No. NG-T-3.17

This publication provides practical guidance for performing strategic environmental assessments (SEAs) for nuclear power programmes. It incorporates the latest knowledge and draws on best practices in conducting SEAs. Based on inputs from SEA experts from across the world, it lays down an effective SEA process that contributes to: strengthening decision making for nuclear power programmes; achieving environmentally sound and sustainable development; and improving good governance and building public trust and confidence in decision-making. Importantly, SEA for nuclear power programmes can ensure effective communication with the public and other stakeholders. Consequently, significant emphasis is placed on stakeholder engagement and public participation. Further, appropriate tools for assessment and quality review are presented for all stages of the SEA process.

English (74 pp., 17 figs; 2018) | ISBN 978-92-0-104418-1 | STI/PUB/1815 | €36.00

Commissioning Guidelines for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-2.10



Commissioning is one of the key steps towards putting into service a new nuclear facility, or a new system, structure or component within an existing facility. Commissioning activities need to be planned early in the design and procurement process, with careful consideration of eventual acceptance criteria and test methods. This publication describes commissioning in its basic form, the commissioning process specific to nuclear power plants (NPPs), the relevant management system requirements, typical organizational models and critical human resources issues. It also provides details on experience and lessons learned obtained in Member States. The publication will be of use to all stakeholders involved in the commissioning of NPPs, including owner operators, contractors, engineers, regulatory bodies and vendors.

English (133 pp., 31 figs; 2018) | ISBN 978-92-0-102816-7 | STI/PUB/1742 | €48.00

Economic Assessment of the Long Term Operation of Nuclear Power Plants: Approaches and Experience

IAEA Nuclear Energy Series No. NP-T-3.25



This publication describes the various approaches to the techno-economic assessment of a project for the long term operation of a nuclear power plant in its specific market environment. It examines the process of defining the technical scope required to prolong the operating licences of nuclear power plants and highlights the

need for further studies on technical cost drivers and economic assessments in order to better define the cost boundaries of long term operation. Information is also provided on the new IAEA software LTOFIN, which was developed to assist in performing long term operation economic assessments within the process described in the publication.

English (126 pp., 27 figs; 2018) | ISBN 978-92-0-104218-7 | STI/PUB/1813 | €47.00

Energy, Electricity and Nuclear Power Estimates for the Period up to 2050

2018 Edition

Reference Data Series No. 1



The 38th edition of the annual Reference Data Series No. 1 contains estimates of energy, electricity and nuclear power trends up to the year 2050, using a variety of sources, such as the IAEA's Power Reactor Information System and data prepared by the United Nations.

English (139 pp., 62 figs; 2018) | ISBN 978-92-0-104918-6 | IAEA-RDS-1/38 | €18.00

Experience in Modelling Nuclear Energy Systems with MESSAGE: Country Case Studies

IAEA TECDOC Series No. 1837



Member States have recognized the increasing need to model future nuclear power scenarios in order to develop strategies for sustainable nuclear energy systems. The IAEA model for energy supply strategy alternatives and their general environmental impacts (MESSAGE) code is a tool that supports energy analysis and planning in Member States. This publication documents the experience gained on modelling and scenario analysis of nuclear energy systems (NES) using the MESSAGE code through various case studies performed by the participating Member States on evaluation and planning for nuclear energy sustainability at the regional or national level. The publication also elaborates on experience gained in modelling of global nuclear energy systems with a focus on specific aspects of collaboration among technology holder and technology user countries and the introduction of innovative nuclear technologies. It presents country case studies covering a variety of nuclear energy systems based on a once-through fuel cycle and a closed fuel cycle for thermal reactors, fast reactors

and advanced systems. The feedback from case studies proves the analytical capabilities of the MESSAGE model and highlight the path forward for further advancements in the MESSAGE code and NES modelling.

English (280 pp., 238 figs; 2018) | ISBN 978-92-0-109417-9 | IAEA-TECDOC-1837 | €18.00

Handbook on Ageing Management for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.24



This handbook on ageing management for nuclear power plants (NPPs) has been developed in compliance with relevant IAEA safety standards and draws on lessons learned from ageing management practices worldwide. It provides an overview of the topic and guidance on proactive ageing management within NPPs. The publication also collates information on ageing mechanisms, effects on structures, systems and components, the regulatory framework as well as some details on innovative techniques and research and development in the area. The information is presented concisely with clear flow charts and with structured reference to the underlying principles. The handbook will support NPP staff, maintenance managers, vendors, personnel at research organizations and regulators in their work related to the ageing of structures, systems and components.

English (152 pp., 66 figs; 2017) | ISBN 978-92-0-102416-9 | STI/PUB/1738 | €48.00

Managing the Financial Risk Associated with the Financing of New Nuclear Power Plant Projects

IAEA Nuclear Energy Series No. NG-T-4.6



Mitigation of the financial risks attendant on a nuclear power plant new build project is a key to ensuring project viability. This publication emphasizes how various risks - including those typically considered to be 'engineering risks' --- will give rise to such financial risks. It then introduces the linkage between efficient financial risk allocation/ mitigation and the cost of capital, and sets out a range of mechanisms which can be used to manage and allocate risks efficiently, thereby minimizing the cost of capital and enhancing project economics. At a practical level the publication provides an insight into the concerns, modes of thinking, and language which a nuclear new-build proponent may expect to encounter within the financing community as they seek to develop their project.

English (93 pp., 33 figs; 2017) | ISBN 978-92-0-100317-1 | STI/PUB/1765 | €32.00

Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants

Specific Safety Guide

IAEA Safety Standards Series No. SSG-48

This Safety Guide supplements and provides recommendations on meeting the requirements related to ageing management and long term operation that are established in IAEA Safety Standards Series No. SSR-2/1 (Rev.1), Safety of Nuclear Power Plants: Design, and IAEA Safety Standards Series No. SSR-2/2 (Rev.1), Safety of Nuclear Power Plants: Commissioning and Operation. It provides guidance for operating organizations on implementing and improving ageing management and, obsolescence management and on developing a programme for safe long term operation for nuclear power plants. It may also be used by the regulatory body in preparing regulatory requirements, codes and standards, and in verifying effective ageing management, obsolescence management and preparation for safe long term operation of nuclear power plants.

English (Forthcoming) | ISBN 978-92-0-104318-4 | STI/PUB/1814 | €43.00

Buried and Underground Piping and Tank Ageing Management for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.20



This publication is one in a series of reports on the assessment and management of ageing of the major nuclear power plant (NPP) components. It deals with buried and underground piping and tank systems that are included as part of an NPP and addresses potential ageing mechanisms, age related degradation, and ageing management as well as condition assessments for the material and components of such systems. The intended target audience for this publication are NPP owners, operators, designers, engineers and specialists.

English (377 pp., 227 figs; 2018) | ISBN 978-92-0-102116-8 | STI/PUB/1735 | €60.00

Industrial Safety Guidelines for Nuclear Facilities

IAEA Nuclear Energy Series No. NP-T-3.3

These IAEA guidelines on industrial safety for nuclear facilities are co-sponsored by the International Labour Organization. Specific review of industrial safety practices at nuclear plants have been part of the IAEA OSART (Operational Safety Review Team) missions for decades, and supplementary guidance for such reviews has been available since 1990. This publication presents the latest good practices that nuclear organizations have put into place to implement high quality industrial safety programmes.

English (Forthcoming) | ISBN 978-92-0-101617-1 | STI/PUB/1774 | €60.00

Maintenance Optimization Programme for Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.8



This publication deals with the latest nuclear power plant maintenance optimization programmes and provides key requirements and strategies for successful implementation. It documents shared proven maintenance optimization methods and techniques from Member States, including more detailed examples in the annexes of this publication.

English (48 pp., 8 figs; 2018) | ISBN 978-92-0-110916-3 | STI/PUB/1757 | €39.00

Non-baseload Operation in Nuclear Power Plants: Load Following and Frequency Control Modes of Flexible Operation

IAEA Nuclear Energy Series No. NP-T-3.23



This publication aims to address all relevant aspects of flexible (non-baseload) operation of nuclear power plants (NPPs) specifically focusing on changing electrical output to match the electrical demand and to control the frequency of the electrical system. It provides collective guidance based on current knowledge and operational experience, for the decision making, preparation and implementation of flexible operation for Member States who are considering future flexible operations of their NPPs.

English (173 pp., 62 figs; 2018) | ISBN 978-92-0-110816-6 | STI/PUB/1756 | €40.00

Nuclear Power Plant Operating Experience

from the IAEA/NEA International Reporting System for Operating Experience 2012–2014



The International Reporting System for Operating Experience (IRS) is an essential element of the international operating experience feedback system for nuclear power plants. Its fundamental objective is to contribute to improving safety of commercial nuclear power plants which are operated worldwide. IRS reports contain information on events of safety significance with important lessons learned which assist in reducing recurrence of events at other plants. This sixth publication, covering the period 2012–2014, follows the structure of the previous editions. It highlights important lessons based on a review of the approximately 240 event reports received from the participating countries over this period.

English (53 pp., 9 figs; 2018) | ISBN 978-92-0-102417-6 | STI/PUB/1780 | €28.00

Operating Experience with Nuclear Power Stations in Member States

2018 Edition

Operating Experience



This CD-ROM contains the 49th edition of the IAEA's series of annual reports on operating experience with nuclear power plants in Member States. It is a direct output from the IAEA's Power Reactor Information System (PRIS). The dashboards of individual operational reactor units contain information on their overall performance during 2017. In addition to annual information, the report contains a historical summary of

performance during the lifetime of individual plants and figures illustrating worldwide performance of the nuclear industry.

English (CD Edition; 2018) | ISBN 978-92-0-153718-8 | STI/PUB/1828 | €75.00 ()

Technical Support to Nuclear Power Plants and Nuclear Power Progammes

IAEA Nuclear Energy Series No. NP-T-3.28



This publication addresses relevant aspects of requesting and obtaining effective technical support (TS) and its adequate utilization in decision making on nuclear power programmes, projects and plants. It describes the TS functions and associated organizational activities and skills in providing technical and scientific input to the decisions on plant safety and performance throughout the plant's lifecycle and serves as a guidance for establishing and sustaining TS capability and capacity in Member States both embarking on nuclear power programmes and operating nuclear power plants.

The publication also presents observations, lessons learned and conclusions drawn from good practices for defining and maintaining roles, responsibilities and interfacing requirements of technical support organizations (TSOs), nuclear power project/plant entities and other stakeholders. As such, it provides a set of descriptive and practiced processes that integrate technical and scientific information for safety, performance and economical aspects in support of sound and timely decisions on the safe, reliable and efficient operation of nuclear power plants.

English (130 pp.; 20 figs; 2018) | ISBN 978-92-0-103018-4 | STI/PUB/1824 | €42.00

Accelerator Simulation and Theoretical Modelling of Radiation Effects in Structural Materials

IAEA Nuclear Energy Series No. NF-T-2.2



This publication summarizes the findings and conclusions of the IAEA coordinated research project (CRP) on accelerator simulation and theoretical modelling of radiation effects, aimed at supporting Member States in the development of advanced radiation resistant structural materials for implementation in innovative nuclear systems. This aim can be achieved through enhancement of both experimental neutron-emulation capabilities of ion accelerators and improvement of the predictive efficiency of theoretical models and computer codes. This dual approach is challenging but necessary, because outputs of accelerator simulation experiments need adequate theoretical interpretation, and theoretical models and codes need high dose experimental data for their verification. Both ion irradiation investigations and computer modelling have been the specific subjects of the CRP, and the results of these studies are presented in this publication which also includes state-of-the-art reviews of four major aspects of the project: challenges and trends of structural materials development

for present and future reactor designs, accelerator methodologies for material testing, multiscale modelling tools, and advanced examination techniques.

English (116 pp.; 2018) | ISBN 978-92-0-107415-7 | STI/PUB/1732 | €39.00

Approaches for Overall Instrumentation and Control Architectures of Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-2.11



This publication concerns approaches for establishing the overall instrumentation and control (I&C) architecture of a nuclear power plant. It describes the characteristics and content of general I&C architectures, presents architectural principles and addresses the limitation of the potential effects of postulated common cause failures. It introduces an architectural development process and discusses technical considerations for the design. The publication emphasizes safety aspects, addresses the defence in depth concept, but also includes consideration of plant availability, operability and security. It recognizes the potential for adverse effects of I&C failures on plant availability and operability that may arise from increased architectural complexity, and also describes the optimization of I&C functionality and features that are required to be implemented.

English (55 pp., 9 figs; 2018) | ISBN 978-92-0-102718-4 | STI/PUB/1821 | €30.00

Benchmark Analysis for Condition Monitoring Test Techniques of Aged Low Voltage Cables in Nuclear Power Plants

Final Results of a Coordinated Research Project

IAEA TECDOC Series No. 1825



This publication provides information and guidelines on how to monitor the performance of insulation and jacket materials of existing cables and establish a programme of cable degradation monitoring and ageing management for operating reactors and the next generation of nuclear facilities. This research was done through a coordinated research project (CRP) with participants from 17 Member States. This group of experts compiled the current knowledge in a report together with areas of future research and development to cover aging mechanisms and means to identify and manage the consequences of aging. They established a benchmarking programme using cable samples aged under thermal and/or radiation conditions, and tested before and after ageing by various methods and organizations. The results of these benchmark tests were then compared to identify the best condition monitoring methods and establish recommendations for improvements. The conclusions of the data analysis provided insight into condition monitoring techniques which yield usable or traceable results.

English (192 pp., 133 figs; 2017) | ISBN 978-92-0-107317-4 | IAEA-TECDOC-1825 | €18.00

Enhancing Benefits of Nuclear Energy Technology Innovation through Cooperation among Countries: Final Report of the INPRO Collaborative Project SYNERGIES

IAEA Nuclear Energy Series No. NF-T-4.9



This publication provides a summary of the INPRO collaborative project on synergistic nuclear energy regional group interactions evaluated for sustainability. Benefits of nuclear technology innovation can be amplified through co-operation among countries in the nuclear fuel cycle. Nuclear energy sustainability can be enhanced, not only for technology holders but also for a variety of technology users, including those who do not pursue innovations in their home countries. If one partner in a synergistic collaboration is achieving enhanced sustainability, then the other partner(s) may achieve similar enhancement through collaboration without the requisite large national investments in technology, R&D and related infrastructure development. Within the publication, 28 case studies have been conducted by Member States to identify and evaluate mutually beneficial patterns of cooperation in the nuclear fuel cycle and the driving forces and impediments involved in such cooperation.

English (356 pp., 227 figs; 2018) | ISBN 978-92-0-101118-3 | STI/PUB/1807 | €66.00

Experimental Facilities in Support of Liquid Metal Cooled Fast Neutron Systems

IAEA Nuclear Energy Series No. NP-T-1.15



This publication presents both an overview and detailed information on more than 150 experimental facilities being used for developing and deploying innovative liquid metal-cooled (sodium, lead and lead-bismuth) fast neutron systems, both critical and subcritical. Facilities, both under construction and those in operation are considered. It is expected that by providing the end users with detailed information on existing and future experimental facilities able to support innovative liquid metal cooled fast neutron systems, the publication will facilitate cooperation between organizations and knowledge transfer. An overview of the existing and future experimental facilities is presented in the body text of this publication. The profiles of all facilities in form of individual papers are available on the attached CD-ROM and in the related on-line database maintained by the IAEA Catalogue of Facilities in Support of Liquid Metal Cooled Fast Neutron Systems (LMFNS Catalogue).

English (52 pp; 2018) | ISBN 978-92-0-101018-6 | STI/PUB/1806 | €30.00

Instrumentation and Control Systems for Advanced Small Modular Reactors

IAEA Nuclear Energy Series No. NP-T-3.19



This publication emphasizes the key cross cutting technological issues associated with instrumentation and control systems and human system interfaces that arise from the specific behaviour and operational characteristics of advanced small modular reactors (SMRs). It is intended to assist Member States in understanding

current knowledge, practices, design and architecture, implementation, operating and maintenance related aspects with I&C systems in SMRs, as well as for discussing the challenges and issues that need to be resolved in this field in the first phases of design and implementation by Member States active in SMR development.

English (95 pp., 27 figs; 2017) | ISBN 978-92-0-101217-3 | STI/PUB/1770 | ${\bf \in} 39.00$

On-line Monitoring of Instrumentation in Research Reactors

IAEA TECDOC Series No. 1830

IAEA TECDOC SERIES	
On-line Monitoring of Instrumentation in Research Reactors	WAR-TECODE-1830
(⁶) IAEA	

This publication is the result of a benchmarking effort undertaken under the IAEA coordinated research project on improved instrumentation and control (I&C) maintenance techniques for research reactors. It lays the foundation for implementation of on-line monitoring (OLM) techniques and establishment of the validity of those for improved

maintenance practices in research reactors for a number of applications such as change to condition based calibration, performance monitoring of process instrumentation systems, detection of process anomalies and to distinguish between process problems/effects and instrumentation/sensor issues. The techniques and guidance embodied in this publication will serve the research reactor community in providing the technical foundation for implementation of OLM techniques. It is intended to be used by Member States to implement I&C maintenance and to improve performance of research reactors.

English (80 pp., 38 figs; 2017) | ISBN 978-92-0-108517-7 | IAEA-TECDOC-1830 | €18.00

Severe Accident Mitigation through Improvements in Filtered Containment Vent Systems and Containment Cooling Strategies for Water Cooled Reactors

Proceedings of a Technical Meeting on Severe Accident Mitigation through Improvements in Filtered Containment Venting for Water Cooled Reactors Held in Vienna, Austria, 31 August–3 September 2015

IAEA TECDOC Series No. 1812



One of the most important lessons from the accident at the Fukushima Daiichi nuclear power plant is that a reliable containment venting system can be crucial for effective accident management during severe accidents, especially for smaller volume containments in relation to the rated nuclear power. Containment venting can enhance the capability to maintain core cooling and containment integrity as well as reduce uncontrolled radioactive releases to the environment if the venting system has a filtration capacity. In general, a filtered containment vent system increases the flexibility of plant personnel in coping with unforeseen events. This publication provides the overview of the current status of related activities with the goal to share information between Member States on actions, upgrades, and new technologies pertaining to containment cooling and venting.

English (270 pp., 119 figs; 2017) | ISBN 978-92-0-153817-8 | IAEA-TECDOC-1812 | €18.00

QUALITY ASSURANCE

Benchmark Analysis of EBR-II Shutdown Heat Removal Tests

IAEA TECDOC Series No. 1819



This publication presents the results and main achievements of an IAEA coordinated research project to verify and validate system and safety codes used in the analyses of liquid metal thermal hydraulics and neutronics phenomena in sodium cooled fast reactors. The publication will be of use to the researchers and professionals currently working on relevant fast reactors programmes. In addition, it is intended to support the training of the next generation of analysts and designers through international benchmark exercises.

English (478 pp., 400 figs; 2017) | ISBN 978-92-0-105517-0 | IAEA-TECDOC-1819 | €18.00

Dependability Assessment of Software for Safety Instrumentation and Control Systems at Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.27



This publication defines a framework that represents the state of the art in assessment methodologies for safety and instrumentation and control software used at nuclear power plants. It describes an approach for developing and communicating assessments based on claims, argument and evidence. The assessment of software dependability, which encompasses properties such as safety, reliability, availability, maintainability and security, is an essential and challenging aspect of the safety justification. Guiding principles for a dependability assessment are established to provide the basis for defining an assessment strategy and implementing the assessment process. Sources of evidence for the assessment are provided and lessons learned from past digital instrumentation and control system implementation in areas such as software development, operational usage, regulatory review and platform certification are also described.

English (80 pp., 10 figs; 2018) | ISBN 978-92-0-101218-0 | STI/PUB/1808 | €38.00

Managing Counterfeit and Fraudulent Items in the Nuclear Industry

IAEA Nuclear Energy Series No. NP-T-3.26

Counterfeit and fraudulent items (CFIs) are of increasing concern in the nuclear industry and generally throughout the industrial and commercial supply chains. Experience has shown that a lack of control of the processes involved in the sourcing, receipt, use and/ or disposal of items can lead to the introduction of counterfeit or fraudulent items into a nuclear facility. This publication is designed to assist Member State organizations to prevent, detect and address CFIs on an ongoing basis. It provides users with recognized good practices for the introduction of a programme to effectively manage CFIs in the nuclear industry.

English (Forthcoming) | ISBN 978-92-0-102318-6 | STI/PUB/1817 | €39.00

A Framework for Sustainable Nuclear Education: Education Capability Assessment and Planning

IAEA Nuclear Energy Series No. NG-T-6.5

This publication provides a framework for maximizing the potential of the education systems in developing countries to contribute to the promotion and development of nuclear science and technology. Establishing nuclear science and technology, and the requisite educational system, in developing countries is a delicate balance. Factors such as social acceptance, resource mobilization, human capital, job opportunities, recruitment sustainability and nuclear contributions to socioeconomic development need to be carefully considered to enable the maximum benefits to be derived. Progress towards this aim can be achieved within the framework of the Education Capability Assessment and Planning methodology, which provides tools for developing countries to establish a sustainable national nuclear education system with coordinated strategy, policy and planning. Countries that apply this methodology can benefit from a more systematic and integrated strategic approach to developing, enhancing and improving their national nuclear education systems. These improvements come through strengthened interaction and coordination between government, educators and industry.

English (Forthcoming) | ISBN 978-92-0-101318-7 | STI/PUB/1809 | €35.00

Developing a Systematic Education and Training Approach Using Personal Computer Based Simulators for Nuclear Power Programmes

Proceedings of a Technical Meeting Held in Vienna, 15–19 May 2017

IAEA TECDOC Series No. 1836



This publication compiles the output and findings of a technical meeting organized by the IAEA. The use of personal computer (PC) based basic principle simulators in education and training is aimed at enhancing understanding of nuclear technologies through "learning by doing". This hands-on experiential training is highly suitable for operators, maintenance technicians, suppliers, regulators, students and engineers. Experts from 21 Member States, together with IAEA staff, presented the current status of the PC based basic principle simulators, their applications in education and training and identified relevant gaps and needs for improvements and/or new development. The resultant publication includes summaries of the presentations, follow-up discussions as well as conclusions and recommendations for possible future activities.

English (164 pp., 52 figs; 2018) | ISBN 978-92-0-109217-5 | IAEA-TECDOC-1836 | €18.00

Human Resource Development for Nuclear Power Programmes: Building and Sustaining Capacity

Proceedings of an International Conference Held in Vienna, Austria, 12-16 May 2014

Proceedings Series



This publication presents the summary of an international conference on human resource development for nuclear power programmes. The conference provided a forum for information exchange and best practices across governments, industry and education and research institutions. Main topics addressed challenges in human resource development (HRD), education and training, nuclear knowledge management, the establishment of knowledge networks and preparing the next generation of nuclear professionals. The meeting participants reviewed developments in the area of human resources globally, emphasized the importance of human resources and capacity building programmes, and highlighted practices and issues regarding HRD at the organizational and international level. Key findings, recommendations as well as the conclusions of the chairperson are presented. An accompanying CD-ROM contains all papers presented during the conference.

English (44 pp.; 2018) | ISBN 978-92-0-102516-6 | STI/PUB/1739 | €50.00

International Nuclear Management Academy (INMA) Master's Programmes in Nuclear Technology Management

IAEA Nuclear Energy Series No. NG-T-6.12

The International Nuclear Management Academy (INMA) is an IAEA facilitated collaboration framework in which universities or educational institutions provide master's degree programmes that focus on management competencies for the nuclear sector. The current publication presents an overview of these master's degree programmes, addresses the needs, interests and benefits of establishing formal educational programmes at master's level focusing on management aspects for the nuclear sector. It describes common requirements for the INMA-NTM programmes as well as recommendations for implementation, and considers cooperation/collaboration of universities at national and international level. Comprehensive guidance on administrative aspects of the INMA collaboration framework is also outlined and a supplementary CD-ROM attached. The target audience are current managers and young professionals with a potential of becoming future managers.

English (Forthcoming) | ISBN 978-92-0-107217-7 | STI/PUB/1795 | €38.00

Knowledge Loss Risk Management in Nuclear Organizations

IAEA Nuclear Energy Series No. NG-T-6.11



This publication provides a methodology to enable knowledge loss risk management to ensure safe, reliable and efficient operation of nuclear facilities. It focuses on aspects of knowledge loss risks associated with employee attrition and provides guidance to mitigate them. The described methodology has proved itself in nuclear power plants and can be adopted by any other nuclear related organization. The publication also provides examples of best practices (case studies) of effective knowledge loss risk management gathered from the nuclear power plants and nuclear related organizations as outlined in annexes I-V.

English (77 pp., 31 figs; 2017) | ISBN 978-92-0-101816-8 | STI/PUB/1734 | €30.00

Leadership, Human Performance and Internal Communication in Nuclear Emergencies

IAEA Nuclear Energy Series No. NG-T-1.5



This publication focuses on the challenges and their possible solutions in the areas of leadership, human performance and internal communication in a severe nuclear emergency. It presents a brief overview of some of the key concepts, especially how they relate to an organization's ability to successfully manage an emergency event. The target audience for this publication are those officials and senior managers dealing with emergency response in the operating organization, government, local authorities and the regulatory body. Those who have an influence on the style of leadership and personnel development and training that is applied in their organizations and who are involved in emergency preparedness and response will also benefit from this publication.

English (36 pp., 2 figs; 2018) | ISBN 978-92-0-103317-8 | STI/PUB/1789 | €30.00

Regulatory Oversight of Human and Organizational Factors for Safety of Nuclear Installations

IAEA TECDOC Series No. 1846



Written for use by regulatory bodies and their technical support organizations, and those individuals supporting human performance activities and programmes, this publication addresses the definition and implementation of an oversight programme that adequately takes into account human and organizational factors (HOF) to oversee safety throughout the lifetime of nuclear installations. A key concept is that safety is the result of interaction between humans, technology and the organization. Based on the outcome of several international meetings, this publication presents the main elements to be used to enhance regulatory oversight capabilities and describes the essential concepts and terms used in the area of HOF. It is intended to help in the development of regulations and guides related to HOF, stressing the key role of the licensee's management system in establishing and maintaining conditions to support people at work. The TECDOC describes ways to verify compliance with regulatory requirements related to HOF, as well as ways to better understand HOF trends and conclusions, using an integrated safety assessment approach.

English (66 pp., 3 figs; 2018) | ISBN 978-92-0-103318-5 | IAEA-TECDOC-1846 | €18.00





Fuel Fabrication and Performance, Spent Fuel Management

NUCLEAR FUEL CYCLE AND WASTE MANAGEMENT



Data Analysis and Collection for Costing of Research Reactor Decommissioning

Report of the DACCORD Collaborative Project

IAEA TECDOC Series No. 1832



(6) IAEA

This publication is intended to assist those Member States with limited decommissioning expertise, to estimate the overall cost of decommissioning during the early planning stages. The lack of published data has made it difficult to benchmark estimated costs against international practice. The DACCORD (data analysis and collection for costing of research reactor decommissioning) project was established to address this deficiency. Based on the outcome of the three main working groups, this publication provides representative input data and benchmarking data needed for the costing of research reactor decommissioning at preliminary planning stages. All detailed cost cases considered in the DACCORD project are presented in a special format, following a software tool, developed by the IAEA, and which helps to ensure uniformity of the presented data and generally to facilitate the analysis of the available information.

English (124 pp., 69 figs; 2017) | ISBN 978-92-0-108717-1 | IAEA-TECDOC-1832 | €18.00

Decommissioning after a Nuclear Accident: Approaches, Techniques, Practices and Implementation Considerations

IAEA Nuclear Energy Series No. NW-T-2.10

This publication describes differences in post-accident situations compared with normal decommissioning (i.e. decommissioning after a planned final shutdown) and identifies significant decision factors as applicable. It focuses on the onsite decommissioning aspects of a technical nature, which need to be addressed after a nuclear accident. Non-technical issues, such as policy and strategy, project planning, organization and management are also covered. The collection of experience on approaches, techniques, practices and implementation considerations is based on practical examples and lessons learned from past events, including the Fukushima Daiichi accident. Although the publication addresses decommissioning of nuclear power reactors after an accident, many aspects and considerations are also relevant for non-power nuclear facilities as well as legacy nuclear facilities.

English (Forthcoming) | ISBN 978-92-0-104018-3 | STI/PUB/1811 | €39.00

Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities

Specific Safety Guide

IAEA Safety Standards Series No. SSG-47



Decommissioning is the last step in the lifetime management of an authorized facility and it must be considered during the design, construction, commissioning and operation of such facilities. This publication provides guidance on how to comply with requirements for the safe decommissioning of nuclear power plants, research reactors, and other nuclear fuel

cycle facilities. It addresses all the aspects of decommissioning that are required to ensure safety including: roles and responsibilities, strategy and planning for decommissioning, conduct of decommissioning actions and completion of decommissioning. It is intended for use by those working in policy and strategy development, planning, implementation and regulatory control of decommissioning.

English (99 pp., 1 fig.; 2018) | ISBN 978-92-0-104118-0 | STI/PUB/1812 | €40.00
International Safeguards in the Design of Uranium Conversion Plants

IAEA Nuclear Energy Series No. NF-T-4.8



This publication is the fourth in the IAEA Nuclear Energy Series to provide guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of conversion plants; however, vendors, national authorities and financial backers can also benefit from the information provided.

The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

English (36 pp., 11 figs; 2017) | ISBN 978-92-0-100517-5 | STI/PUB/1766 | €30.00

Lessons Learned from the Deferred Dismantling of Nuclear Facilities

IAEA Nuclear Energy Series No. NW-T-2.11



The publication discusses the issues that must be dealt with when preparing the facility for safe enclosure, or safely maintaining it for a long time. It provides details of lessons learned from deferred decommissioning of nuclear facilities following planned shutdown. These lessons have been learned from a

variety of facilities, with a variety of hazards, configurations and decommissioning programmes. While some of the considerations addressed may apply to facilities involved in an operating incident or accident, they are not specifically addressed by this publication as the individual nature of their hazards and decommissioning challenges precludes their use as exemplars. The publication addresses the preparation for, and the steady state part of the safe enclosure phase; it should be understood that in a later part of that phase the on- and offsite requirements and arrangements will change as plans and infrastructure are prepared for the next phase, which is the final dismantling, remediation and site release.

English (116 pp., 41 figs; 2018) | ISBN 978-92-0-100418-5 | STI/PUB/1803 | €44.00

Options for Management of Spent Fuel and Radioactive Waste for Countries Developing New Nuclear Power Programmes

IAEA Nuclear Energy Series No. NW-T-1.24 (Rev. 1)

Many countries are considering the construction of their first nuclear power plant or the expansion of a small nuclear power programme, and some have limited experience in managing radioactive waste and spent nuclear fuel. The present revised publication provides a concise summary of key issues related to the development of a sound radioactive waste and spent nuclear fuel management system. It is intended to brief countries with small or newly established nuclear power programmes about the challenges of, and to describe current and potential alternatives for, managing reactor waste and spent fuel arising during operation and decommissioning of nuclear power plants.

English (Forthcoming) | ISBN 978-92-0-103118-1 | STI/PUB/1825 | €32.00

Status and Trends in Spent Fuel and Radioactive Waste Management

IAEA Nuclear Energy Series No. NW-T-1.14



Based on the outcome of a collaborative project undertaken by the IAEA, OECD-NEA and the European Commission, this publication provides a global overview of the status of radioactive waste and spent fuel management concerning inventories, programmes, current practices, technologies and trends. It includes an analysis of national arrangements and programmes for radioactive waste and spent fuel management, an overview of current waste and spent fuel inventories and estimates of future amounts. International and national trends in these areas are also addressed.

English (57 pp., 25 figs; 2018) | ISBN 978-92-0-108417-0 | STI/PUB/1799 | €39.00

Waste from Innovative Types of Reactors and Fuel Cycles

IAEA Nuclear Energy Series No. NW-T-1.7

For reactors currently operating, the types or wastes expected to be generated under normal operating regime are known and, aside from a few problematic wastes (such as graphite, tritium and radiocarbon) most of these wastes have clearly defined cradle-to-grave (end-to-end) pathways. However, for advanced and innovative reactors and their fuel cycles, some waste types may either have new or different properties or might be problematic for processing with the currently available technologies. One of the primary challenges for advanced and innovative reactors and their nuclear fuel cycles is that solutions must be identified for all eventually problematic wastes prior to initiating construction of these facilities. This publication sets the stage for considering the waste generation of advanced fuel fabrication, reactor operation and decommissioning, reprocessing of spent fuel and waste pathways early in the development of new reactors and their associated fuel cycles. It describes waste flows in broad chemical and physical terms and identifies possible processing, recycling and disposition pathways. The publication is intended to support the nuclear industry in taking an early and integrated approach to waste management.

English (Forthcoming) | ISBN 978-92-0-102818-1 | STI/PUB/1822 | €41.00

World Distribution of Uranium Deposits Second Edition



In 1995 the International Atomic Energy Agency published a hard copy map of World Distribution of Uranium Deposits, in collaboration with the Geological Survey of Canada. This second edition of the World Distribution of Uranium Deposits presents new information, such as additional deposits, a broader range of deposit sizes, a revised deposit classification system and improved geological visualisation information. The online pdf version also includes enhanced functionality with layers and query capability.

English (2018) | ISBN 978-92-0-100118-4 | STI/PUB/1800 | €20.00

International Safeguards in the Design of Fuel Fabrication Plants

IAEA Nuclear Energy Series No. NF-T-4.7



This publication is the third in a series from the IAEA that provides guidance on the early consideration of safeguards requirements in the design and construction of nuclear facilities. It is principally intended for designers and operators of nuclear fuel fabrication facilities; however, vendors, state authorities and investors may also benefit from the information provided. This guidance is introductory rather than comprehensive; more detailed information on IAEA safeguards Agreements and Additional Protocols (IAEA Services Series No. 21, May 2016) and other publications in that series. This publication expands upon the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction (IAEA Nuclear Energy Series No. NP-T-2.8, April 2013).

English (52 pp., 23 figs; 2017) | ISBN 978-92-0-103315-4 | STI/PUB/1699 | €30.00

Research Reactors for the Development of Materials and Fuels for Innovative Nuclear Energy Systems

IAEA Nuclear Energy Series No. NP-T-5.8



This publication presents an overview of research reactor capabilities and capacities in the development of fuels and materials for innovative nuclear reactors, such as Generation IV reactors. The compendium provides comprehensive information on the potential for materials and fuel testing research of 30 research reactors, both operational and in development. This information includes their power levels, mode of operation, current status, availability and historical overview of their utilization. A summary of these capabilities and capacities is presented in the overview tables of section 6. Papers providing a technical description of the research reactors, including their specific features for utilization are collected as profiles on a CD-ROM and represent an integral part of this publication. The publication is intended to foster wider access to information on existing research reactors with capacity for advanced material testing research and thus ensure their increased utilization in this particular domain. It is expected that it can also serve as a supporting tool for the establishment of regional and

international networking through research reactor coalitions and IAEA designated international centres based on research reactors.

English (27 pp., 2 figs; 2017) | ISBN 978-92-0-100816-9 | STI/PUB/1728 | €32.00

Use of Low Enriched Uranium Fuel in Accelerator Driven Subcritical Systems

IAEA TECDOC Series No. 1821



This publication presents the results and conclusions of an international research collaboration devoted to gaining a better understanding of the physics of Accelerator Driven Subcritical Systems (ADS), with particular emphasis on using low enriched uranium (LEU) fuel. The publication contains information on nine ADS facilities, including descriptions of the hardware deployed, experiments conducted, computational resources and procedures used in the analyses, principal results obtained, and conclusions drawn from the knowledge gained as a consequence of this work. It is intended to provide information for users of ADS systems and those involved in the design of new ADS facilities to use LEU fuel and in the conversion of some existing facilities from using highly enriched Uranium (HEU) to LEU.

English (318 pp., 332 figs; 2017) | ISBN 978-92-0-106217-8 | IAEA-TECDOC-1821 | €18.00

SPENT FUEL MANAGEMENT

Available Reprocessing and Recycling Services for Research Reactor Spent Nuclear Fuel

IAEA Nuclear Energy Series No. NW-T-1.11



The high enriched uranium (HEU) take back programmes will soon have achieved their goals. When there are no longer HEU inventories at research reactors and no commerce in HEU for research reactors, the primary driver for the take back programmes will cease. However, research reactors will continue to operate in order to meet their various mission objectives. As a result, inventories of low enriched uranium spent nuclear fuel will continue to be created during the research reactors' lifetime and, therefore, there is a need to develop national final disposition routes. This publication is designed to address the issues of available reprocessing and recycling services for research reactor spent fuel and discusses the various back end management aspects of the research reactor fuel cycle.

English (85 pp., 37 figs; 2017) | ISBN 978-92-0-103216-4 | STI/PUB/1746 | €38.00

International Safeguards in the Design of Facilities for Long Term Spent Fuel Management

IAEA Nuclear Energy Series No. NF-T-3.1



This publication is the fifth in the IAEA Nuclear Energy Series to provide guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of facilities for long term spent fuel management; however, vendors, national authorities and financial backers can also benefit from the information provided. The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

English (70 pp., 25 figs; 2018) | ISBN 978-92-0-100717-9 | STI/PUB/1767 | €36.00

WASTE MANAGEMENT

Advancing the Global Implementation of Decommissioning and Environmental Remediation Programmes

Proceedings of an International Conference Held in Madrid, Spain, 23-27 May 2016

Proceedings Series



These proceedings present the outcome of a conference on decommissioning and environmental remediation (D&ER) programmes, at which challenges, achievements and lessons learned in the implementation of such programmes during the past decade were shared and reviewed. The decision to combine D&ER in one conference reflects the significant synergies that exist between the two activities; the conference aimed to explore those synergies to foster and optimize the implementation of D&ER worldwide. Key goals were to raise awareness of the importance of addressing the legacies from past activities, to identify current priority needs and to provide recommendations on the strategies and approaches that can enable and enhance safe, secure and cost effective implementation of national and international programmes in the future. The conference was organized around seven themes: National policies and strategies; regulatory framework and standards; decision making process; technical and technological aspects; waste management; project management; and

international cooperation. The publication provides a detailed synthesis of the presentations made and the panel discussions which took place during the conference. The main ideas and messages expressed and discussed at the conference are presented in the President's report, which is included in the publication.

English (52 pp.; 2017) | ISBN 978-92-0-111416-7 | STI/PUB/1759 | €40.00

Management of Large Volumes of Waste Arising in a Nuclear or Radiological Emergency

IAEA TECDOC Series No. 1826



This publication, prepared in light of the IAEA Action Plan on Nuclear Safety developed after the accident at the Fukushima Daiichi nuclear power plant, addresses the management of large volumes of radioactive waste arising in a nuclear or radiological emergency, as part of overall emergency preparedness. The management of large volumes of waste will be one of many efforts to be dealt with to allow recovery of affected areas, to support return of evacuated or relocated populations and preparations for normal social and economic activities, and/or to mitigate additional environmental impacts. The publication is intended to be of use to national planners and policy makers, facility and programme managers, and other professionals responsible for developing and implementing national plans and strategies to manage radioactive waste arising from nuclear or radiological emergencies.

English (102 pp., 6 figs; 2017) | ISBN 978-92-0-107417-1 | IAEA-TECDOC-1826 | €18.00

Selection of Technical Solutions for the Management of Radioactive Waste

IAEA TECDOC Series No. 1817



The objectives of this publication are to identify and critically review the criteria to be considered while selecting waste management technologies; summarize, evaluate, rank and compare the different technical solutions; and offer a systematic approach for selecting the best matching solution. This publication covers the management of radioactive waste from all nuclear operations, including waste generated from research reactors, power reactors, and nuclear fuel cycle activities including high level waste (HLW) arising from reprocessing and spent nuclear fuel declared as waste (SFW), as well as low level waste (LLW) and intermediate level waste (ILW) arising from the production and use of radionuclides in industry, agriculture, medicine, education and research.

English (114 pp., 14 figs; 2017) | ISBN 978-92-0-104717-5 | IAEA-TECDOC-1817 | €18.00

Use of the Benchmarking System for Operational Waste from WWER Reactors

IAEA TECDOC Series No. 1815



The focus of this publication is on benchmarking low and intermediate level waste generated and managed during the normal operating life of a WWER, and it identifies and defines the benchmarking parameters selected for WWER type reactors. It includes a brief discussion on why those parameters were selected and their intended benchmarking benefits, and provides a description of the database and graphical user interface selected, designed and developed, including how to use it for data input and data analysis. The CD-ROM accompanying this publication provides an overview of practices at WWER sites, which were to a large extent prepared using the WWER BMS.

English (88 pp., 38 figs; 2017) | ISBN 978-92-0-104617-8 | IAEA-TECDOC-1815 | €18.00





PLASMA PHYSICS AND NUCLEAR FUSION



Atomic and Plasma–Material Interaction Data for Fusion Volume 17

Atomic and Plasma-Material Interaction Data for Fusion



The present volume of Atomic and Plasma–Material Interaction Data for Fusion presents the results of a coordinated research project (CRP) on Atomic Data for Heavy Element Impurities in Fusion Reactors. In accordance with priorities in fusion energy research, data sets related to heavy element impurities are essential in plasma modelling. For example, such as data on the noble gases argon, krypton, and xenon, on the likely wall material tungsten, and on other possible impurities. Much of the work in this CRP focused on possible impurities such as chlorine, iron and silicon. The publication provides fundamental experimental and calculated data for radiative and collisional atomic processes as well as results of collisional-radiative (CR) models. The data are of interest for the interpretation of spectroscopic measurements on current and future fusion experiments, the modelling of tungsten in fusion plasma, and the design and optimization of fusion reactor experiments.

English (212 pp., 137 figs; 2017) | ISBN 978-92-0-105817-1 | STI/PUB/023/APID/17 | €40.00

Investigations of Materials under High Repetition and Intense Fusion Pulses

Report of a Coordinated Research Project 2011-2016

IAEA TECDOC Series No. 1829



This publication presents experimental simulations of plasma-surface interaction phenomena at extreme conditions as expected in a fusion reactor, using dedicated test bed devices such as dense plasma focus, particle accelerators, plasma accelerators and plasma guns. It includes the investigation of the mechanism of material damage during transient heat loads on materials and addresses, in particular, the performance and adequacy of tungsten as plasma facing material for the next step fusion devices, such as ITER and fusion demonstration power plants. The publication is a compilation of the main results and findings of an IAEA coordinated research project on investigations on materials under high repetition and intense fusion pulses, conducted in the period 2011–2016 and provides a practical knowledge base for scientists and engineers carrying out activities in the plasma-material surface interaction area.

English (300 pp., 274 figs; 2017) | ISBN 978-92-0-108217-6 | IAEA-TECDOC-1829 | €18.00

Reproduced courtesy of Max Planck Institute for Plasma Physics

Į

÷

.

.

C

.

C

C

÷e.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

.

•

. 0

.

9)

)

Ð

.

C

D

Ð

.

.

•

3 12

5)

.



SAFEGUARDS



International Safeguards in the Design of Facilities for Long Term Spent Fuel Management

IAEA Nuclear Energy Series No. NF-T-3.1



This publication is the fifth in the IAEA Nuclear Energy Series to provide guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of facilities for long term spent fuel management; however, vendors, national authorities and financial backers can also benefit from the information provided. The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

English (70 pp., 25 figs; 2018) | ISBN 978-92-0-100717-9 | STI/PUB/1767 | €36.00

International Safeguards in the Design of Fuel Fabrication Plants

IAEA Nuclear Energy Series No. NF-T-4.7



This publication is the third in a series from the IAEA that provides guidance on the early consideration of safeguards requirements in the design and construction of nuclear facilities. It is principally intended for designers and operators of nuclear fuel fabrication facilities; however, vendors, state authorities and investors may also benefit from the information provided. This guidance is introductory rather than comprehensive; more detailed information on IAEA safeguards implementation can be found in the Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols (IAEA Services Series No. 21, May 2016) and other publications in that series. This publication expands upon the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction (IAEA Nuclear Energy Series No. NP-T-2.8, April 2013).

English (52 pp., 23 figs; 2017) | ISBN 978-92-0-103315-4 | STI/PUB/1699 | €30.00

International Safeguards in the Design of Uranium Conversion Plants

IAEA Nuclear Energy Series No. NF-T-4.8



This publication is the fourth in the IAEA Nuclear Energy Series to provide guidance on the inclusion of safeguards in nuclear facility design and construction. It is principally intended for designers and operators of conversion plants; however, vendors, national authorities and financial backers can also benefit from the information provided. The publication complements the general considerations addressed in International Safeguards in Nuclear Facility Design and Construction, IAEA Nuclear Energy Series No. NP-T-2.8.

English (36 pp., 11 figs; 2017) | ISBN 978-92-0-100517-5 | STI/PUB/1766 | €30.00





NUCLEAR LAW

STATUTE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY

Developing Regulations and Associated Administrative Measures for Nuclear Security

Implementing Guide

IAEA Nuclear Security Series No. 29-G



This publication aims to assist States to identify the responsibilities of those involved in nuclear security so that suitable regulations, agreements and associated administrative measures may be developed for establishing and sustaining an effective nuclear security regime. The publication is structured to provide an overview of the most important aspects to be covered by a State's legislative and regulatory framework for governing nuclear security. States may therefore use this publication to undertake a gap analysis of their legislative and regulatory framework for nuclear security in order to take actions to update their framework as necessary.

English (60 pp.; 2018) | ISBN 978-92-0-111716-8 | STI/PUB/1762 | €39.00

Functions and Processes of the Regulatory Body for Safety

General Safety Guide

IAEA Safety Standards Series No. GSG-13



This Safety Guide provides recommendations on meeting the requirements of IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), Governmental, Legal and Regulatory Framework for Safety, on the regulatory body's core functions and associated regulatory processes. This guidance is particularly important for regulatory bodies having responsibilities covering a range of facilities and activities that give rise to radiation risks and the important organizational interfaces between various regulatory authorities, which require effective coordination and cooperation. It promotes a consistent approach to regulation and specifically addresses the release of facilities and activities from regulatory control including sites, buildings, equipment and material. The publication is intended to be used mainly by regulatory bodies but will also be useful for governments that are developing a regulatory framework for safety. It will also assist authorized parties and others dealing with radiation sources in understanding regulatory procedures, processes and expectations.

English (137 pp., 2 figs; 2018) | ISBN 978-92-0-100718-6 | STI/PUB/1804 | €52.00

Governmental, Legal and Regulatory Framework for Safety

General Safety Requirements

IAEA Safety Standards Series No. GSR Part 1 (Rev. 1)



This publication establishes requirements in respect of the governmental, legal and regulatory framework for safety. It covers the essential aspects of the framework for establishing a regulatory body and taking other actions necessary to ensure the effective regulatory control of facilities and activities utilized for peaceful purposes. Other responsibilities and functions, such as liaison within the global safety regime and on support services for safety (including radiation protection), emergency preparedness and response, nuclear security, and the State system of accounting for and control of nuclear material, are also covered. A review of Safety Requirements publications was commenced in 2011 following the accident in the Fukushima Dailchi nuclear power plant in Japan. The review revealed no significant areas of weakness and resulted in just a small set of amendments to strengthen the requirements and facilitate their implementation, which are contained in the present publication.

Arabic (40 pp., 2 figs; 2016) | ISBN 978-92-0-611216-8 | STI/PUB/1713 | €48.00Chinese (36 pp., 2 figs; 2016) | ISBN 978-92-0-509716-9 | STI/PUB/1713 | €48.00English (42 pp., 2 figs; 2016) | ISBN 978-92-0-108815-4 | STI/PUB/1713 | €48.00French (42 pp., 2 figs; 2017) | ISBN 978-92-0-208016-4 | STI/PUB/1713 | €48.00Russian (49 pp., 2 figs; 2016) | ISBN 978-92-0-409516-6 | STI/PUB/1713 | €48.00Spanish (44 pp., 2 figs; 2017) | ISBN 978-92-0-311116-4 | STI/PUB/1713 | €48.00

The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage — Explanatory Texts

IAEA International Law Series No. 3 (Revised)



This publication reproduces the explanatory texts on the nuclear liability instruments adopted under the IAEA's auspices. Finalized by the International Expert Group on Nuclear Liability (INLEX), these texts constitute a comprehensive study and authoritative interpretation of the IAEA's nuclear liability regime. More particularly, the texts deal with the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and the Convention on Supplementary Compensation for Nuclear Damage. The publication also presents an overview and brings together the texts of the IAEA's nuclear liability instruments. Finally, it includes a matrix of comparative provisions in the various nuclear liability instruments, as well as the recommendations on how to achieve a global nuclear liability regime, which were adopted by INLEX in 2012 following a request by the IAEA Action Plan on Nuclear Safety.

English (156 pp.; 2017) | ISBN 978-92-0-100817-6 | STI/PUB/1768 | €52.00



ENVIRONMENT



Advancing the Global Implementation of Decommissioning and Environmental Remediation Programmes

Proceedings of an International Conference Held in Madrid, Spain, 23-27 May 2016

Proceedings Series



These proceedings present the outcome of a conference on decommissioning and environmental remediation (D&ER) programmes, at which challenges, achievements and lessons learned in the implementation of such programmes during the past decade were shared and reviewed. The decision to combine D&ER in one conference reflects the significant synergies that exist between the two activities; the conference aimed to explore those synergies to foster and optimize the implementation of D&ER worldwide. Key goals were to raise awareness of the importance of addressing the legacies from past activities, to identify current priority needs and to provide recommendations on the strategies and approaches that can enable and enhance safe, secure and cost effective implementation of national and international programmes in the future. The conference was organized around seven themes: National policies and strategies; regulatory framework and standards; decision making process; technical and technological aspects; waste management; project management; and

international cooperation. The publication provides a detailed synthesis of the presentations made and the panel discussions which took place during the conference. The main ideas and messages expressed and discussed at the conference are presented in the President's report, which is included in the publication.

English (52 pp.; 2017) | ISBN 978-92-0-111416-7 | STI/PUB/1759 | €40.00

Guidelines for Developing Wetlands in Agricultural Catchments

IAEA TECDOC Series No. 1811



This publication presents the results of an international research project on optimizing the capture and storage of water by assessing nutrient using water conservation zones in agricultural landscapes. Eight countries from Asia Pacific, Africa and Europe participated in the project. Field studies were established in all participating countries using isotopic and nuclear techniques to assess three types of water conservation zones that are used to harvest water for irrigation, crop production and improve downstream water quality. In addition, isotopic and nuclear techniques were used to collect data to identify the ideal locations in the landscapes for developing wetlands. The publication provides information to researchers working in the area of soil and water management, natural resource managers, policy makers and farmers. For those working to develop wetlands, information is provided to support planning, monitoring and evaluation.

English (68 pp., 16 figs; 2017) | ISBN 978-92-0-100917-3 | IAEA-TECDOC-1811 | €18.00

Guidelines on Soil and Vegetation Sampling for Radiological Monitoring

Technical Reports Series No. 486

This publication addresses the sampling of soil and vegetation in terrestrial ecosystems, including agricultural, forest and urban environments, contaminated with radionuclides from events such as radiation accidents, radiological incidents and former nuclear activities. It considers sampling strategies and programmes, which are relevant for both emergency and existing exposure situations. Practical advice is provided on the design and implementation of sampling programmes for soil and vegetation within the framework of environmental monitoring. Examples of best practice on the formulation of optimized sampling strategies for different exposure situations are given based on the experience and lessons learned from implementation of past and existing programmes.

English (Forthcoming) | ISBN 978-92-0-102218-9 | STI/D0C/010/486 | €76.00

Performance of Models in Radiological Impact Assessment for Normal Operation

Report of Working Group 1

Reference Methodologies for Controlling Discharges of Routine Releases of EMRAS II

Topical Heading Reference Approaches for Human Dose Assessment

IAEA TECDOC Series No. 1808



This publication provides the results from Working Group 1, on Reference Methodologies for Controlling Discharges of Routine Releases, of the IAEA's EMRAS II (Environmental Modelling for Radiation Safety) programme, which ran from 2009 to 2011. This Working Group carried out an intercomparison of methods used for assessing radiological impacts to people and the environment due to authorized releases of radionuclides during normal operation of nuclear facilities. Three important types of exposure scenarios were considered, those related to atmospheric, marine and river releases. The publication describes the details of the hypothetical radioactive release scenarios, the environmental pathways considered, the environmental transfer models applied, the calculation methods and the results obtained. An analysis of the results and the main findings and conclusions relevant for the use of the described input data and methodologies in regulatory applications is included. The publication also presents considerations on selection of the 'representative person' and

a summary of the different approaches in some States for the regulatory control of radioactive discharges. Input data is included in the annex.

English (98 pp., 15 figs; 2017) | ISBN 978-92-0-112616-0 | IAEA-TECDOC-1808 | €18.00

Prospective Radiological Environmental Impact Assessment for Facilities and Activities

General Safety Guide

IAEA Safety Standards Series No. GSG-10



This Safety Guide provides recommendations and guidance on a general framework for performing prospective radiological impact assessments for facilities and activities, to estimate and control the radiological effects on the public and on the environment. This radiological environmental impact assessment is intended for planned exposure situations as part of the authorization process and, when applicable, as part of a governmental decision making process for facilities and activities. The situations covered in the assessment include both exposures expected to occur in normal operation as well as potential exposures. The assessment of the radiological impacts includes consideration of the risk of radiation effects for humans and for populations of non-human biota. Guidance is provided on the assumptions and input data to be used, the necessary models for environmental transfer and radiation dose assessment and the definition and use of criteria for informing decisions.

English (82 pp., 5 figs; 2018) | ISBN 978-92-0-102518-0 | STI/PUB/1819 | €40.00

Regulatory Control of Radioactive Discharges to the Environment

General Safety Guide

IAEA Safety Standards Series No. GSG-9



This Safety Guide is intended to assist governments, regulatory bodies, applicants for a licence and operating organizations with a structured approach to controlling radiation exposures of the public resulting from discharges from normal operations of facilities and activities, and with the optimization of protection and safety. More specifically, this publication addresses the process for authorization of discharges from new and modified facilities or activities, and the review of established authorizations. The guidance applies to different types of facilities, which range from nuclear installations to applications of radioisotopes in industry, medicine and research. It also covers the controllable releases to the environment in normal operation that may result from the mining and processing of ores for the extraction of uranium or thorium as part of the nuclear fuel cycle and discharges of naturally occurring radioactive material in non-nuclear industries.

English (71 pp., 5 figs; 2018) | ISBN 978-92-0-102418-3 | STI/PUB/1818 | €42.00

Strategic Environmental Assessment for Nuclear Power Programmes: Guidelines

IAEA Nuclear Energy Series No. NG-T-3.17

This publication provides practical guidance for performing strategic environmental assessments (SEAs) for nuclear power programmes. It incorporates the latest knowledge and draws on best practices in conducting SEAs. Based on inputs from SEA experts from across the world, it lays down an effective SEA process that contributes to: strengthening decision making for nuclear power programmes; achieving environmentally sound and sustainable development; and improving good governance and building public trust and confidence in decision-making. Importantly, SEA for nuclear power programmes can ensure effective communication with the public and other stakeholders. Consequently, significant emphasis is placed on stakeholder engagement and public participation. Further, appropriate tools for assessment and quality review are presented for all stages of the SEA process.

English (74 pp., 17 figs; 2018) | ISBN 978-92-0-102018-5 | STI/PUB/1815 | €36.00

The Environmental Behaviour of Polonium

Technical Reports Series No. 484



This publication covers polonium behaviour in the terrestrial, freshwater and marine environments, dose considerations and mitigation and remediation options. Additionally, case studies are presented. The primary objective is to provide Member States with information for use in the radiological assessment of accidental releases and routine discharges of polonium in the environment, and in remediation planning for areas contaminated by polonium.

English (255 pp., 32 figs; 2017) | ISBN 978-92-0-112116-5 | STI/D0C/010/484 | €80.00



IAEA TECHNICAL COOPERATION



IAEA Technical Cooperation Programme: Sixty Years and Beyond — Contributing to Development

Proceedings of an International Conference Held in Vienna, 30 May-1 June 2017

Proceedings Series



These proceedings detail how the TC programme has contributed to the establishment of national nuclear infrastructure and capabilities in Member States over six decades, in support of their national development priorities. The publication also presents examples of successful partnerships and looks to the future regarding appropriate approaches and concrete measures that will help countries to maximize their use of nuclear science and technology in achieving their development goals, including sustainable development goal targets. Key thematic areas covered include the application of nuclear science and technology in human health and nutrition, food and agriculture, water and the environment, radiation technology, energy and safety. Common issues relating to regional collaboration and networking are presented, as is the IAEA and Member States' approach to building lasting and mutually beneficial partnerships.

English (100 pp., 33 figs; 2018) | ISBN 978-92-0-100318-8 | STI/PUB/1802 | 36.00

SERIES INDEX

Atomic and Plasma–Material	Interaction Data for Fusion	
Atomic and Plasma–Material Interaction Data for Fusion	Atomic and Plasma–Material Interaction Data for Fusion Volume 17	118
IAEA Human Health Reports S	eries	
IAEA Human Health Reports No. 15	Medical Physics Staffing Needs in Diagnostic Imaging and Radionuclide Therapy: An Activity Based Approach	14
IAEA Human Health Reports No. 16	Introduction of Image Guided Radiotherapy into Clinical Practice	14
IAEA International Law Series		
IAEA International Law Series No. 3 (Revised)	The 1997 Vienna Convention on Civil Liability for Nuclear Damage and the 1997 Convention on Supplementary Compensation for Nuclear Damage — Explanatory Texts	127
IAEA Nuclear Energy Series		
IAEA Nuclear Energy Series No. NF-T-2.2	Accelerator Simulation and Theoretical Modelling of Radiation Effects in Structural Materials	29, 97
IAEA Nuclear Energy Series No. NF-T-3.1	International Safeguards in the Design of Facilities for Long Term Spent Fuel Management	113, 122
IAEA Nuclear Energy Series No. NF-T-4.7	International Safeguards in the Design of Fuel Fabrication Plants	111,122
IAEA Nuclear Energy Series No. NF-T-4.8	International Safeguards in the Design of Uranium Conversion Plants	109, 123
IAEA Nuclear Energy Series No. NF-T-4.9	Enhancing Benefits of Nuclear Energy Technology Innovation through Cooperation among Countries: Final Report of the INPRO Collaborative Project SYNERGIES	98
IAEA Nuclear Energy Series No. NG-T-1.5	Leadership, Human Performance and Internal Communication in Nuclear Emergencies	64, 104
IAEA Nuclear Energy Series No. NG-T-3.16	Strategic Planning for Research Reactors	34
IAEA Nuclear Energy Series No. NG-T-3.17	Strategic Environmental Assessment for Nuclear Power Programmes: Guidelines	91, 133
IAEA Nuclear Energy Series No. NG-T-3.18	Feasibility Study Preparation for New Research Reactor Programmes	32, 59
IAEA Nuclear Energy Series No. NG-T-4.6	Managing the Financial Risk Associated with the Financing of New Nuclear Power Plant Projects	94
IAEA Nuclear Energy Series No. NG-T-6.5	A Framework for Sustainable Nuclear Education: Education Capability Assessment and Planning	102
IAEA Nuclear Energy Series No. NG-T-6.11	Knowledge Loss Risk Management in Nuclear Organizations	104
IAEA Nuclear Energy Series No. NG-T-6.12	International Nuclear Management Academy (INMA) Master's Programmes in Nuclear Technology Management	103
IAEA Nuclear Energy Series No. NP-T-1.15	Experimental Facilities in Support of Liquid Metal Cooled Fast Neutron Systems	99
IAEA Nuclear Energy Series No. NP-T-2.10	Commissioning Guidelines for Nuclear Power Plants	92

IAEA Nuclear Energy Series No. NP-T-2.11	Approaches for Overall Instrumentation and Control Architectures of Nuclear Power Plants	97
IAEA Nuclear Energy Series No. NP-T-3.3	Industrial Safety Guidelines for Nuclear Facilities	55, 95
IAEA Nuclear Energy Series No. NP-T-3.8	Maintenance Optimization Programme for Nuclear Power Plants	95
IAEA Nuclear Energy Series No. NP-T-3.19	Instrumentation and Control Systems for Advanced Small Modular Reactors	99
IAEA Nuclear Energy Series No. NP-T-3.20	Buried and Underground Piping and Tank Ageing Management for Nuclear Power Plants	94
IAEA Nuclear Energy Series No. NP-T-3.23	Non-baseload Operation in Nuclear Power Plants: Load Following and Frequency Control Modes of Flexible Operation	95
IAEA Nuclear Energy Series No. NP-T-3.24	Handbook on Ageing Management for Nuclear Power Plants	93
IAEA Nuclear Energy Series No. NP-T-3.25	Economic Assessment of the Long Term Operation of Nuclear Power Plants: Approaches and Experience	92
IAEA Nuclear Energy Series No. NP-T-3.26	Managing Counterfeit and Fraudulent Items in the Nuclear Industry	101
IAEA Nuclear Energy Series No. NP-T-3.27	Dependability Assessment of Software for Safety Instrumentation and Control Systems at Nuclear Power Plants	54, 101
IAEA Nuclear Energy Series No. NP-T-3.28	Technical Support to Nuclear Power Plants and Nuclear Power Progammes	96
IAEA Nuclear Energy Series No. NP-T-4.1	Opportunities for Cogeneration with Nuclear Energy	91
IAEA Nuclear Energy Series No. NP-T-4.3	Industrial Applications of Nuclear Energy	42, 90
IAEA Nuclear Energy Series No. NP-T-5.8	Research Reactors for the Development of Materials and Fuels for Innovative Nuclear Energy Systems	111
IAEA Nuclear Energy Series No. NW-T-1.7	Waste from Innovative Types of Reactors and Fuel Cycles	110
IAEA Nuclear Energy Series No. NW-T-1.11	Available Reprocessing and Recycling Services for Research Reactor Spent Nuclear Fuel	112
IAEA Nuclear Energy Series No. NW-T-1.14	Status and Trends in Spent Fuel and Radioactive Waste Management	110
IAEA Nuclear Energy Series No. NW-T-1.24 (Rev. 1)	Options for Management of Spent Fuel and Radioactive Waste for Countries Developing New Nuclear Power Programmes	109
IAEA Nuclear Energy Series No. NW-T-2.10	Decommissioning after a Nuclear Accident: Approaches, Techniques, Practices and Implementation Considerations	108
IAEA Nuclear Energy Series No. NW-T-2.11	Lessons Learned from the Deferred Dismantling of Nuclear Facilities	109

IAEA Nuclear Security Series		
IAEA Nuclear Security Series No. 7	Nuclear Security Culture	84
IAEA Nuclear Security Series No. 18	Nuclear Security Systems and Measures for Major Public Events	85
IAEA Nuclear Security Series No. 19	Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme	54, 83
IAEA Nuclear Security Series No. 22-G	Radiological Crime Scene Management	86
IAEA Nuclear Security Series No. 23-G	Security of Nuclear Information	86
IAEA Nuclear Security Series No. 25-G	Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities	87
IAEA Nuclear Security Series No. 27-G	Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5)	85
IAEA Nuclear Security Series No. 28-T	Self-assessment of Nuclear Security Culture in Facilities and Activities	86
IAEA Nuclear Security Series No. 29-G	Developing Regulations and Associated Administrative Measures for Nuclear Security	82, 126
IAEA Nuclear Security Series No. 30-G	Sustaining a Nuclear Security Regime	87
IAEA Nuclear Security Series No. 31-G	Building Capacity for Nuclear Security	46, 80
IAEA Nuclear Security Series No. 32-T	Establishing a System for Control of Nuclear Material for Nuclear Security Purposes at a Facility during Use, Storage and Movement	82
IAEA Nuclear Security Series No. 33-T	Computer Security of Instrumentation and Control Systems at Nuclear Facilities	81

IAEA Radiation Technology Series

IAEA Radiation Technology Series No. 6

Uses of Ionizing Radiation for Tangible Cultural Heritage Conservation

IAEA Radioisotopes and Radiopharmaceuticals Reports

IAEA Radioisotopes and Radiopharmaceuticals Reports No. 2 Cyclotron Based Production of Technetium-99m

12

28

IAEA Safety Standards Series

The IAEA Safety Standards Series comprises publications of a regulatory nature covering nuclear safety, radiation protection, radioactive waste management, the transport of radioactive material, the safety of nuclear fuel cycle facilities and management systems. These publications are issued under the terms of Article III of the IAEA's Statute, which authorizes the IAEA to establish "standards of safety for protection of health and minimization of danger to life and property". Safety standards are categorized into:

- · Safety Fundamentals, stating the basic objective, concepts and principles of safety;
- · Safety Requirements, establishing the requirements that must be fulfilled to ensure safety; and
- Safety Guides, recommending measures for complying with these requirements for safety.

For numbering purposes, the IAEA Safety Standards Series is subdivided into General Safety Requirements and General Safety Guides (GSR and GSG), which are applicable to all types of facilities and activities, and Specific Safety Requirements and Specific Safety Guides (SSR and SSG), which are for application in particular thematic areas.

Please note that this index does not detail all available safety standards. Only titles published in 2017 and 2018 and those forthcoming in 2019 are shown. For a full list, please visit the IAEA books website: www.iaea.org/books or email: sales.publications@iaea.org.

Governmental, Legal and Regulatory Framework for Safety	74, 127
Leadership and Management for Safety	49
Safety Assessment for Facilities and Activities	72
Decommissioning of Facilities	47, 67
Preparedness and Response for a Nuclear or Radiological Emergency	65
The Management System for Nuclear Installations	50
Communication and Consultation with Interested Parties by the	73
Regulatory Body	
Occupational Radiation Protection	62
Radiation Protection of the Public and the Environment	63
Regulatory Control of Radioactive Discharges to the Environment	75, 132
Prospective Radiological Environmental Impact Assessment for Facilities and Activities	71, 132
Arrangements for the Termination of a Nuclear or Radiological Emergency	64
Organization, Management and Staffing of the Regulatory Body for Safety	75
Functions and Processes of the Regulatory Body for Safety	73, 126
	Governmental, Legal and Regulatory Framework for Safety Leadership and Management for Safety Safety Assessment for Facilities and Activities Decommissioning of Facilities Preparedness and Response for a Nuclear or Radiological Emergency The Management System for Nuclear Installations Communication and Consultation with Interested Parties by the Regulatory Body Occupational Radiation Protection Radiation Protection of the Public and the Environment Prospective Radiological Environmental Impact Assessment for Facilities Arrangements for the Termination of a Nuclear or Radiological Emergency Organization, Management and Staffing of the Regulatory Body for Safety Functions and Processes of the Regulatory Body for Safety

General Safety Standards (applicable to all facilities and activities)

Specific Safety Standards (applicable to specified facilities and activities)

Nuclear Power Plants

IAEA Safety Standards Series No. NS-R-3 (Rev. 1)	Site Evaluation for Nuclear Installations	49
IAEA Safety Standards Series No. SSR-2/1 (Rev. 1)	Safety of Nuclear Power Plants: Design	58
IAEA Safety Standards Series No. SSR-2/2 (Rev. 1)	Safety of Nuclear Power Plants: Commissioning and Operation	57
IAEA Safety Standards Series No. SSG-47	Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities	67, 108
IAEA Safety Standards Series No. SSG-48	Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants	52, 94
IAEA Safety Standards Series No. SSG-50	Operating Experience Feedback for Nuclear Installations	55

Research Reactors

IAEA Safety Standards Series No. NS-R-3 (Rev. 1)	Site Evaluation for Nuclear Installations	49
IAEA Safety Standards Series No. SSR-3	Safety of Research Reactors	60
IAEA Safety Standards Series No. SSG-47	Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities	67, 108
IAEA Safety Standards Series No. SSG-50	Operating Experience Feedback for Nuclear Installations	55

Fuel Cycle Facilities

IAEA Safety Standards Series No. NS-R-3 (Rev. 1)	Site Evaluation for Nuclear Installations	49
IAEA Safety Standards Series No. SSR-4	Safety of Nuclear Fuel Cycle Facilities	51
IAEA Safety Standards Series No. SSG-42	Safety of Nuclear Fuel Reprocessing Facilities	52
IAEA Safety Standards Series No. SSG-43	Safety of Nuclear Fuel Cycle Research and Development Facilities	51
IAEA Safety Standards Series No. SSG-47	Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities	67, 108
IAEA Safety Standards Series No. SSG-50	Operating Experience Feedback for Nuclear Installations	55

Application of Radiation Sources

IAEA Safety Standards Series No. SSG-32	Protection of the Public against Exposure Indoors due to Radon and Other Natural Sources of Radiation	63
IAEA Safety Standards Series No. SSG-44	Establishing the Infrastructure for Radiation Safety	48
IAEA Safety Standards Series No. SSG-45	Predisposal Management of Radioactive Waste from the Use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education	69
IAEA Safety Standards Series No. SSG-46	Radiation Protection and Safety in Medical Uses of Ionizing Radiation	12, 63

Transport of Radioactive Material

IAEA Safety Standards Series No. SSR-6 (Rev. 1)	Regulations for the Safe Transport of Radioactive Material (2018 Edition)	60
IAEA Safety Standards Series No. TS-G-1.4	The Management System for the Safe Transport of Radioactive Material	61

IAEA TECDOC Series

The IAEA Technical Documents (IAEA TECDOC) Series reports on many aspects of the IAEA's work. Please note, however, that titles in this series are not edited and, therefore, may not always conform to the high quality standards of other IAEA publications. The IAEA does not assume any responsibility for consequences which may arise from the use of older titles.

Print copies of IAEA TECDOCs (if in stock) are available at €18.00 per title.

Most publications are issued in English, although some are also available in other languages.

IAEA TECDOC Series No. 1808	Performance of Models in Radiological Impact Assessment for Normal Operation	71, 131
IAEA TECDOC Series No. 1809	Cosmic Ray Neutron Sensing: Use, Calibration and Validation for Soil Moisture Estimation	21, 26
IAEA TECDOC Series No. 1810	Status of Radon Related Activities in Member States Participating in Technical Cooperation Projects in Europe	64
IAEA TECDOC Series No. 1811	Guidelines for Developing Wetlands in Agricultural Catchments	19, 130
IAEA TECDOC Series No. 1812	Severe Accident Mitigation through Improvements in Filtered Containment Vent Systems and Containment Cooling Strategies for Water Cooled Reactors	58, 100
IAEA TECDOC Series No. 1813	Managing Irrigation Water to Enhance Crop Productivity under Water- limiting Conditions: A Role for Isotopic Techniques	22
IAEA TECDOC Series No. 1814	Contents and Sample Arguments of a Safety Case for Near Surface Disposal of Radioactive Waste	66
IAEA TECDOC Series No. 1815	Use of the Benchmarking System for Operational Waste from WWER Reactors	115
IAEA TECDOC Series No. 1816	Model Regulations for Decommissioning of Facilities	68
IAEA TECDOC Series No. 1817	Selection of Technical Solutions for the Management of Radioactive Waste	114
IAEA TECDOC Series No. 1818	Assessment of Equipment Capability to Perform Reliably under Severe Accident Conditions	69
IAEA TECDOC Series No. 1819	Benchmark Analysis of EBR-II Shutdown Heat Removal Tests	100
IAEA TECDOC Series No. 1820	Identification of High Confidence Nuclear Forensics Signatures	83
IAEA TECDOC Series No. 1821	Use of Low Enriched Uranium Fuel in Accelerator Driven Subcritical Systems	112
IAEA TECDOC Series No. 1822	Development of a Reference Database for Particle Induced Gamma Ray Emission (PIGE) Spectroscopy	34
IAEA TECDOC Series No. 1823	Use of Carbon Isotopic Tracers in Investigating Soil Carbon Sequestration and Stabilization in Agroecosystems	20

IAEA TECDOC Series No. 1824	Generic Post-closure Safety Assessment for Disposal of Disused Sealed Radioactive Sources in Narrow Diameter Boreholes	61
IAEA TECDOC Series No. 1825	Benchmark Analysis for Condition Monitoring Test Techniques of Aged Low Voltage Cables in Nuclear Power Plants	98
IAEA TECDOC Series No. 1826	Management of Large Volumes of Waste Arising in a Nuclear or Radiological Emergency	65, 68, 114
IAEA TECDOC Series No. 1827	Model Regulations for Borehole Disposal Facilities for Radioactive Waste	62
IAEA TECDOC Series No. 1828	Approaches to Improvement of Crop Genotypes with High Water and Nutrient Use Efficiency for Water Scarce Environments	18
IAEA TECDOC Series No. 1829	Investigations of Materials under High Repetition and Intense Fusion Pulses	118
IAEA TECDOC Series No. 1830	On-line Monitoring of Instrumentation in Research Reactors	99
IAEA TECDOC Series No. 1831	Proficiency Testing by Interlaboratory Comparison Performed in 2010–2015 for Neutron Activation Analysis and Other Analytical Techniques	28, 33
IAEA TECDOC Series No. 1832	Data Analysis and Collection for Costing of Research Reactor Decommissioning	108
IAEA TECDOC Series No. 1833	Best Practices in Physics Based Fault Rupture Models for Seismic Hazard Assessment of Nuclear Installations	29, 70
IAEA TECDOC Series No. 1834	Assessment of Vulnerabilities of Operating Nuclear Power Plants to Extreme External Events	53
IAEA TECDOC Series No. 1835	Technical and Scientific Support Organizations Providing Support to Regulatory Functions	76
IAEA TECDOC Series No. 1836	Developing a Systematic Education and Training Approach Using Personal Computer Based Simulators for Nuclear Power Programmes	102
IAEA TECDOC Series No. 1837	Experience in Modelling Nuclear Energy Systems with MESSAGE: Country Case Studies	93
IAEA TECDOC Series No. 1838	Advances in Neutron Activation Analysis of Large Objects with Emphasis on Archaeological Examples	26
IAEA TECDOC Series No. 1839	Development of an Integrated Approach to Routine Automation of Neutron Activation Analysis	27, 30
IAEA TECDOC Series No. 1840	Cassava Production Guidelines for Food Security and Adaption to Climate Change in Asia and Africa	18
IAEA TECDOC Series No. 1841	Challenges and Opportunities for Crop Production in Dry and Saline Environments in ARASIA Member States	21
IAEA TECDOC Series No. 1842	Geological Classification of Uranium Deposits and Description of Selected Examples	38
IAEA TECDOC Series No. 1843	World Distribution of Uranium Deposits (UDEPO) 2016 Edition	39
IAEA TECDOC Series No. 1844	Analyses Supporting Conversion of Research Reactors from High Enriched Uranium Fuel to Low Enriched Uranium Fuel	31
IAEA TECDOC Series No. 1845	Soil Moisture Mapping with a Portable Cosmic Ray Neutron Sensor	22, 28
IAEA TECDOC Series No. 1846	Regulatory Oversight of Human and Organizational Factors for Safety of Nuclear Installations	76, 105
-----------------------------	---	---------
IAEA TECDOC Series No. 1847	Rice Production Guidelines: Best Farm Management Practices and the Role of Isotopic Techniques	19
IAEA TECDOC Series No. 1848	Criteria for Diverse Actuation Systems for Nuclear Power Plants	53
IAEA TECDOC Series No. 1849	Uranium Resources as Co- and By-products of Polymetallic, Base, Rare Earth and Precious Metal Ore Deposits	38

INSAG Series		
INSAG Series No. 27	Ensuring Robust National Nuclear Safety Systems — Institutional Strength in Depth	47
Operating Experience		
	Operating Experience with Nuclear Power Stations in Member States 2018 Edition	96
Proceedings Series		
	Advancing the Global Implementation of Decommissioning and Environmental Remediation Programmes	113, 130
	Human and Organizational Aspects of Assuring Nuclear Safety — Exploring 30 Years of Safety Culture	48
	Human Resource Development for Nuclear Power Programmes: Building and Sustaining Capacity	103
	IAEA Technical Cooperation Programme: Sixty Years and Beyond — Contributing to Development	136
	International Conference on Effective Nuclear Regulatory Systems: Sustaining Improvements Globally	74
	International Conference on Nuclear Security: Commitments and Actions	84
	Research Reactors: Safe Management and Effective Utilization	33, 59
	Topical Issues in Nuclear Installation Safety	50

Reference Data Series

Reference Data Series No. 1	Energy, Electricity and Nuclear Power Estimates for the Period up to 2050 2018 Edition	92
Reference Data Series No. 2	Nuclear Power Reactors in the World 2018 Edition	90

Safety Reports Series Safety Reports Series No. 86 Safety Aspects of Nuclear Power Plants in Human Induced External Events: 56 **General Considerations** Safety Reports Series No. 87 Safety Aspects of Nuclear Power Plants in Human Induced External Events: 56 Assessment of Structures Safety Aspects of Nuclear Power Plants in Human Induced External Events: Safety Reports Series No. 88 57 Margin Assessment 53, 70 Safety Reports Series No. 92 Consideration of External Hazards in Probabilistic Safety Assessment for Single Unit and Multi-unit Nuclear Power Plants Safety Reports Series No. 93 A Methodology for Establishing a National Strategy for Education and 46 Training in Radiation, Transport and Waste Safety Safety Reports Series No. 94 Approaches to Safety Evaluation of New and Existing Research Reactor 59 Facilities in Relation to External Events Methodologies for Assessing the Induced Activation Source Term for Use in Safety Reports Series No. 95 68 **Decommissioning Applications** 72 Safety Reports Series No. 96 Technical Approach to Probabilistic Safety Assessment for Multi-Units

Technical Reports Series		
Technical Reports Series No. 481	Manual of Good Practice in Food Irradiation	20
Technical Reports Series No. 483	Dosimetry of Small Static Fields Used in External Beam Radiotherapy	13
Technical Reports Series No. 484	The Environmental Behaviour of Polonium	30
Technical Reports Series No. 485	Improvement of the Reliability and Accuracy of Heavy Ion Beam Analysis	31
Technical Reports Series No. 486	Guidelines on Soil and Vegetation Sampling for Radiological Monitoring	131

Ordering Locally

IAEA priced publications may be purchased from the sources listed below or from major local booksellers. Orders for unpriced publications should be made directly to the IAEA. The contact details are given at the end of this list.

NORTH AMERICA

Bernan / Rowman & Littlefield

15200 NBN Way, Blue Ridge Summit, PA 17214, USA Tel: +1 800 462 6420 • Fax: +1 800 338 4550 orders@rowman.com • www.rowman.com/bernan

Renouf Publishing Co. Ltd

22-1010 Polytek Street, Ottawa, ON K1J 9J1, CANADA Tel: +1 613 745 2665 • Fax: +1 643 745 7660 order@renoufbooks.com • www.renoufbooks.com

REST OF WORLD

Please contact your preferred local supplier, or our lead distributor

Eurospan Group

Gray's Inn House 127 Clerkenwell Road London EC1R 5DB United Kingdom

Trade orders & enquiries: Tel. +44 (0) 1767604972 • Fax. +44 (0) 1767601640 eurospan@turpin-distribution.com

Individual orders: www.eurospanbookstore.com Individuals may also order using the contact details above

For further information: Tel. +44 (0) 2072400856 • Fax. +44 (0) 2073790609 info@eurospangroup.com • www.eurospangroup.com

Orders for both priced and unpriced publications may be addressed directly to:

Marketing and Sales Unit

International Atomic Energy Agency Vienna International Centre, PO Box 100, 1400 Vienna, Austria Telephone: +43 1 2600 22529 or 22530 • Fax: +43 1 26007 22529 Email: sales.publications@iaea.org • Web site: www.iaea.org/books



Order Form

ISBN	Title	Language	Copies	Price (€)
	Total*			

* Prices do not include shipping and handling and are subject to change. All shipments are normally sent via non-priority mail. Customers are responsible for any taxes or duties.

Name	
Full Address	
Tel	Fax
Email	
Payment by	MasterCard Visa Expiry date
	Card Number
	Please send me a catalogue of IAEA publications.
	I do not wish to receive information on related IAEA publications.

To order your copies, please visit: www.eurospanbookstore.com/iaea (free delivery worldwide when ordering through this website)

Or, send your order to: Eurospan Group, 127 Clerkenwell Road, London EC1R 5DB, Email: eurospan@turpin-distribution.com

For more information on IAEA publications: Marketing and Sales Unit, International Atomic Energy Agency, Vienna International Centre, PO Box 100, 1400 Vienna, Austria, Tel: +43 1 2600 22529/30, Fax: +43 1 26007 22529, Email: sales.publications@iaea.org, www.iaea.org/books

Thousands of books online iaea.org/books



Sign up for new book alerts via iaea.org/books or by emailing us at sales.publications@iaea.org www.iaea.org/books

International Atomic Energy Agency Publications Catalogue 2019